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Associations for the Improvement of Dairy Herds in Western Australia.

REPORT FOR YEAR ENDED 30th APRIL, 1941.

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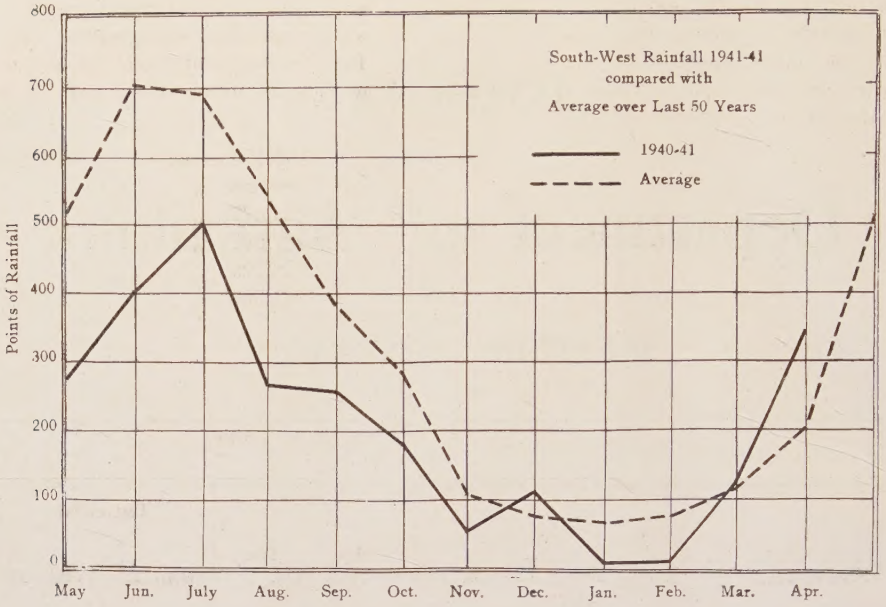
In presenting the annual report of the operations of Grade Herd Recording Units in Western Australia for the year 1940-41, an endeavour has been made to bring before farmers the lessons to be learnt from the combined data obtained during the year, and the inferences which may be drawn from the various tables appended.

At the outset it should be understood that, however desirable it may be, it is not reasonable to expect a steady increase in the average annual production of butter-fat, as so many accidental and other factors may combine to off-set the increase in average yield which could be expected as a result of better feeding, culling low producing stock and their replacing with heifers from the best cows sired by a bull of proved type. Perhaps the main factor influencing production is the season, by which term is known the general growing conditions of pastures, and includes not only quantity of rainfall, but what is equally important, the time of the year at which it falls.

During 1939 heavy rains were experienced in July, followed by almost drought conditions in September, but even these undesirable conditions provided a better growing season than the one just closed, in which the rainfall throughout the South-West dairying districts was almost 12 inches lower than the average over the past 50 years. The accompanying graph will illustrate that, except for a few early showers in April, practically every month showed rainfall below the average.

The low winter falls resulted in poor penetration and consequent small reserves of soil moisture. As a consequence, feed dried off before reaching maximum growth and with greater rapidity than usual, thereby reducing the quantity of fodder available for conservation either as hay or silage.



From the foregoing it will be realised that a drop of 20 lbs. in the average fat yield was no more than anticipated, and under the circumstances is of no more significance than the expected high average which the commencement of the present season promises.

It will be noted from the following table that the number of cows under test has fallen appreciably since last year and that owing to a decline in membership, due almost entirely to the shortage of farm labour, consequent upon war conditions, it has been necessary to close three units and absorb the few remaining members in other units.

TABLE 1.

AVERAGE PRODUCTION PER COW, 1934–41.

Year.	No. of Cows.	Milk.	Test.	Butter-fat.
		gals.	%	lb.
1933–34 ...	4,038	415	4·35	180·6
1934–35 ...	4,088	456	4·56	207·8
1935–36 ...	4,590	459	4·51	207·3
1936–37 ...	9,115	434	4·53	196·7
1937–38 ...	10,033	486	4·59	223·1
1938–39 ...	12,368	487	4·48	218·7
1939–40 ...	11,479	462	4·51	208·3
1940–41 ...	9,609	447	4·22	188·6

In connection with this table, an interesting point may be made in that although the average production throughout herd recording units has dropped, factory production of butter, cheese and condensed milk has shown an increase over previous years, which appears to indicate that contrary to popular belief, the number of cows being milked is greater than ever before. It is unfortunate, therefore, that

while this trend is taking place, herd recording is, of necessity, restricted owing to the unsettled outlook of farmers. However, it is expected that when normal conditions return every endeavour will be made by farmers to profit from the lessons provided year after year in herd recording. The upward trend of the dairy cow population is indicated by the following figures:—

1935	.. ..	130,132 cows.
1936	.. ..	126,358 „
1937	.. ..	124,077 „
1938	.. ..	127,591 „
1939	.. ..	128,725 „
1940	.. ..	131,369 „

Figures for 1941 are not yet available.

TABLE 2.

PRODUCTION PER COW IN EACH UNIT.

Unit.	No. of Herds.	No. of Cows.	Percentage of Heifers.*	Milk.	Test.	Butter-fat.	
						1940–41.	1939–40.
				lb.	%	lb.	lb.
A. Donnybrook ...	22	468	34	4,213	4·81	202·68	203·30
B. Serpentine ...	14	337	30	5,144	4·31	222·24	232·16
C. Cookernup ...	22	664	34	4,838	4·29	218·50	237·70
D. Harvey	21	465	36	4,431	4·52	200·32	235·52
E. Brunswick ...	20	588	40	5,141	4·59	236·48	251·88
F. Dardanup ...	21	466	40	4,469	4·45	199·02	199·51
G. Capel	16	711	33	4,729	3·96	187·26	198·02
H. Balingup ...	18	492	34	4,891	4·49	219·61	220·37
I. Forest Grove ...	23	458	19	4,589	4·63	212·66	210·96
J. Pemberton ...	21	308	30	4,656	4·82	224·81	227·41
K. Rosa Brook ...	22	467	36	4,164	4·63	192·84	208·07
L. Vasse	21	434	34	4,362	4·23	177·42	159·60
M. Manjimup ...	25	567	26	4,054	4·39	178·21	187·47
O. Benger	17	413	40	4,337	4·32	187·52	214·00
P. Pinjarra	22	481	34	4,092	4·71	190·79	205·67
S. Albany	24	506	38	4,446	4·39	195·11	220·16
T. Bridgetown ...	17	473	32	3,948	4·28	169·22	182·34
U. Metricup ...	22	394	18	4,482	4·49	201·44	193·90
W. Northcliffe ...	21	467	24	4,189	4·53	189·91	171·29
X. Cowaramup ...	20	450	40	4,490	4·52	202·88	204·94

* Including cows 2 and 3 years old.

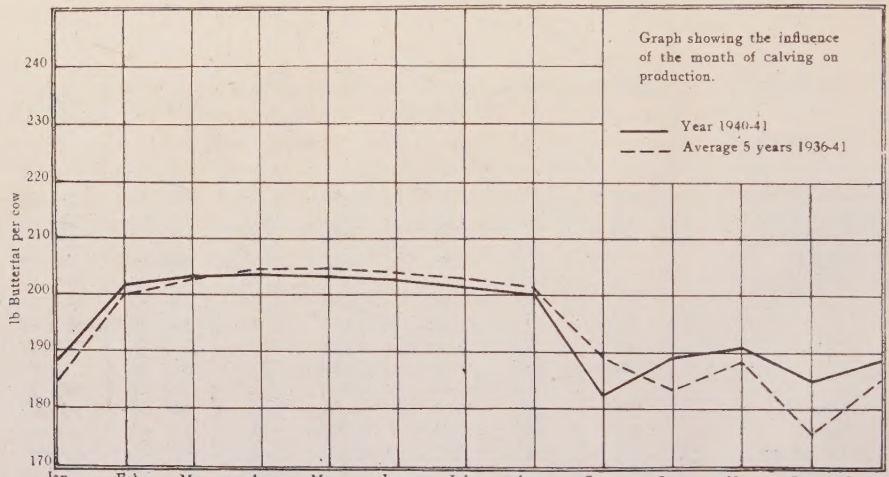
Of the 20 sets of averages shown above, the production of 16 units fell below last year's figures, the drop being greatest in the older-established districts, whilst four comparatively new units slightly improved their average. It is significant, however, that these latter units included the lowest number of young cows which, as will be shown later, must have influenced the average.

Reference to the tables at the end of this report will show that even in the units where average production has declined, some excellent figures have been recorded by the leading herds, and it is noteworthy that in most instances their owners have had the advantage of several years of recording to assist them in building up such high producing herds.

Many potentially high producing cows and many others which may be at present only barely profitable could be made more profitable if handled according to accepted principles which have evolved as the result of experience gained over many years throughout the dairying countries of the world. Briefly, these are as follows:—

1. Controlled mating.
2. Ample reserves of conserved fodder.
3. Rotational grazing of paddocks.
4. Supplementary feeding according to production.
5. Regular milking with equal periods between.
6. Cleanliness resulting in freedom from disease.

Whilst not necessarily arranged in order of importance, the points detailed above have been headed purposely by controlled mating as this one factor can profoundly affect the annual yield of the herd.



	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cows
	101	206	578	1189	1249	1200	1182	705	370	222	138	103	1940-41
	529	905	2705	5938	6818	6741	6615	3762	1919	1078	576	400	1936-41

This graph amply illustrates the point, and it will be seen that the cows which calved during the months April to July gave the highest yields of butter-fat. They had the benefit of the maximum period of green grazing. It is advisable to give a word of warning with reference to this subject. It is possible to arrange to have cows calving in May and yet they may not give good yields because they were in poor condition at calving or there was insufficient feed to enable them to produce a full flow of milk.

A cow before calving has a three-fold use for her feed if she is to prove most successful as a producer of milk in the following lactation. She has to maintain her body as well as develop a healthy calf. In addition the development of the mammary tissue which enlarges the udder and allows free secretion of milk is made before calving. It is important that sufficient feed for this latter purpose is provided, as otherwise the cow will not be able to produce to the limits of her capacity if the udder tissue has not been developed. The farmer may judge whether the cows are getting sufficient feed for this purpose, by noticing whether the cows

are gaining or declining in condition before calving. If they are gaining it is evident that a surplus for their natural bodily requirements is being provided. A reserve of fodder as hay or silage is therefore always advisable for use at this time of the year.

In the six points enumerated above it may be remarked that herd recording has not been included, but point 4 implies its use and it is taken for granted that every farmer, whether a member or not, realises the value of knowing which cows are worth retaining for breeding purposes and which should be culled to the butcher.

A perusal of the record sheets indicates that certain cows will produce profitably one season, and the next will be a liability on the farm, whilst others will show consistently high figures year after year, indicating that continued testing is essential to maintain a high standard. The policy of breeding indiscriminately from all cows on the farm will at the best give very slow results. Frequently one sees an expensive, high quality, pure bred bull mated to cows, which after having revealed their low capacity should have been fattened for market, when the careful selection of breeding stock from consistent high producers will build up a good strain from which the farmer can, with confidence, rear heifers which will develop into high producing cows.

The standard yield below which a cow should be culled will vary with each herd, but once established should be rigidly adhered to, and unless under exceptional circumstances, no cow given a second chance. As a starting point in a new herd this figure should certainly not be below 200 lbs. of butter-fat with an increase in the standard for each generation.

TABLE 3.

COWS COMPLETING LACTATION.

Unit.	Percentage Cows completing Lactation.*	Butter-fat Average.	Percentage Cows completing full 273 days.	Butter-fat Average.	Unit Butter-fat Average.
		lbs.		lbs.	lbs.
A. Donnybrook ...	81	206·66	38	256·4	202·68
B. Serpentine ...	56	249·32	27	272·0	222·24
C. Cookernup ...	66	235·04	44	284·5	218·50
D. Harvey	56	215·40	31	266·7	200·32
E. Brunswick ...	73	241·12	56	265·6	236·48
F. Dardanup ...	50	215·60	40	242·5	199·02
G. Capel	69	204·45	21	223·2	187·26
H. Balingup	91	223·21	51	245·2	219·61
I. Forest Grove ...	72	228·38	41	253·5	212·66
J. Pemberton ...	74	235·74	35	310·0	224·81
K. Rosa Brook ...	61	209·36	44	247·9	192·84
L. Vasse	60	190·24	44	239·2	177·42
M. Manjimup ...	76	199·33	33	222·9	178·21
O. Benger	91	191·41	24	234·8	187·52
P. Pinjarra	92	191·24	30	249·8	190·79
S. Albany	90	207·92	35	260·0	195·11
T. Bridgetown ...	100	169·22	14	234·8	169·22
U. Met icup	71	217·55	54	234·3	201·44
W. Northcliffe ...	75	211·83	43	232·6	189·91
X. Cowaramup ...	71	211·85	38	238·3	202·88

* *i.e.*, 273 days or drying-off naturally in a lesser period.

Whilst the unit average includes all cows tested for 90 days and over, the above table shows also the average yield of cows which actually remained in milk for nine months, and so completed the full 273-day testing period.

The average yield of cows which either completed 273 days or dried off naturally in a lesser period is also shown. The latter two sets of averages indicate plainly that many cows did not maintain a reasonable milk flow for nine months. This may have been due to late calving or to inherent poor milking qualities. It may have been due to some other fault, lack of fodder, overstocking, or to the fact that dairying is looked on as a purely seasonal occupation. This is the case in Bridgetown, where fruit-growing is carried out in conjunction with dairying. In this district it will be noted that only 14 per cent. of the cows remained in milk for nine months. In the Donnybrook unit 43 per cent. of the cows completed their lactation, but did not remain in milk for the full period. The average production of these cows was 162 lbs. only, compared with 256.4 lbs. for those completing 273 days. It is obvious, therefore, that higher production will follow the practice of maintaining the cows in milk for a full lactation of 273 days. This may most easily be done by arranging calving during the period May-July, so that the maximum grazing period may be provided. The additional safeguards of conserved fodder and of having the cows in good condition will help towards getting the higher yields.

TABLE 4.

HERDS GROUPED ACCORDING TO PRODUCTION.

Butter-Fat per head. (lb.)

Year.	350–400.	300–350.	250–300.	200–250.	150–200.	100–150.	Under 100.
	%	%	%	%	%	%	%
1933–34 ...	...	1·31	3·93	20·30	53·55	18·30	2·61
1939–40 ...	...	3·23	18·48	34·62	32·89	9·69	1·08
1940–41 ...	...	1·47	13·93	31·79	39·37	12·71	·73

Table 4 is of particular significance this year, as it indicates that although the general average has dropped almost to the level of the first year of testing, the number of farmers who have benefitted by herd recording has been considerable, for whilst in 1933-34 only 25 per cent. of the herds averaged over 200 lb. butter-fat, last year this figure had risen to nearly 50 per cent., with more than twice as many cows under test.

It was not anticipated that a large percentage of herds would occupy positions above 200 lbs., as new members with low producing herds are entering the scheme each year, whilst many of the older established herds are being broken up to form the nucleus of new herds. It is satisfactory that so many farmers with low producing herds are anxious to submit their herds for testing. This is an indication that the benefits of testing are being recognised and that the farmers are sufficiently keen to welcome the opportunity of acquiring the assistance which is available in the scheme with a view to increasing the yield of their herds.

They rightly consider the small cost of testing, not as a fee, but as an annual investment.

TABLE 5.

COWS GROUPED ACCORDING TO AGE AND PRODUCTION.

(Cows tested less than 90 days excluded.)

Groups according to Butter-Fat Production. (lb.)

Age	Over 500.	400–500.	300–400.	200–300.	150–200.	100–150.	Under 100.	Total Cows.
	%	%	%	%	%	%	%	
Mature	...	0·9	11·1	45·5	24·2	13·5	4·8	6,447
Junior*	...	...	3·0	28·4	28·5	26·9	13·2	3,162

* Including cows 2 and 3 years old.

The table above is very illuminating as it provides a further reason for the decline in average production in that one-third of the cows under test were two and three-year-old heifers. This proportion is far too high for profitable working and whilst a few herds must necessarily contain a high percentage of young cows, it should be remembered that over 400 herds are here included, a sufficient number to diminish almost to zero the effect of isolated young herds. Allowing only six years as the average useful life of a cow, and the majority are retained considerably after this age, replacement need be only one in six, or 17 per cent., and farmers should beware of endeavouring to increase rapidly the size of the herd by retaining all heifers dropped, irrespective of the butter-fat production of their dams. That insufficient discrimination is being practised in the selection of young stock is proved by this table which shows that only 31 per cent. of all heifers tested can be regarded as having been profitable in this lactation. This provides further evidence of the necessity for establishing sound and reliable strains from which to replace culls and maintain herd size without decrease in production.

As an indication of what may be achieved by concentrating on the selection of heifers from good cows sired by bulls of high butter-fat backing, the results of the S.A. Mitchell Competition in the Brunswick unit may be given. A trophy is given annually to the owner of the highest producing three heifers. It has been won this year by Mrs. D. B. Rose, whose heifers averaged 305.76 lbs. of butter-fat. It is interesting to study the progress towards maturity of the various heifers winning the trophy, and those owned by Messrs. A. F. Clifton & Co., of Brunswick, may be taken as an example to prove that the original production was no "fluke." Subsequent productions to their win in 1937-38 were as follows:—

1937-38	.. .. ..	318.17 lbs. butter-fat.
1938-39	.. .. ..	375.81 „ „
1939-40	.. .. ..	375.72 „ „
1940-41	.. .. ..	414.25 „ „

Proved Bulls.

Continuing the policy established some years ago of listing "proved" bulls with the average production of their daughters, a further 14 bulls have been added this year, particulars of which appear below.

It is a matter of some regret that many good bulls have been sold or slaughtered before their worth could be established, and the early testing, which is available to members of herd recording units, has in many cases saved valuable animals, and so deferred the cost of replacement several years.

TABLE 6.
ADDITIONAL LIST OF PROVED BULLS.

Name of Bull.	No. of Daughters Averaged.	Average Butter-fat Production.	Unit.	Owner or Late Owner.	Age of Bull.
Australian Illawarra Shorthorn—					
		lbs.			years.
Hillview Mayflower's Emblem	6	231·91	Balingup ...	A. M. Brazier ...	16
Rocky Glen Playboy	11	235·50	Albany ...	Burvill Sisters ...	7
Friesian—					
Cadelelup Trim Top	6	242·54	Brunswick ...	C. D. Bell	6
Seven Hills Frank ...	6	225·97	Metricup ...	A. Hancock ...	dead
Jersey—					
Airlie Twylish ...	7	276·52	Rosa Brook ...	D. P. Smith ...	dead
Brookvale Prince	9	283·71	Manjimup ...	Mrs. M. Young ...	dead
Colmyn Ginger ...	6	236·37	Forest Grove	H. Eddy	6
Glenallen Pride ...	10	260·94	Metricup ...	W. J. Burt ...	7
Grass Vale Bold Boy	9	255·15	Cookernup ...	J. Salerian ...	5
Grass Vale Gay Boy	6	263·73	Dardanup ...	J. H. Brett ...	5
Juadine Prince ...	7	283·08	Harvey ...	Mrs. A. G. Eckersley	8
Sabina Vale Clarence	6	237·76	Dardanup ...	A. J. Fowler ...	5
Sunnyhurst Golden Lad	12	209·94	Bridgetown ...	J. R. Collins ...	8
Travalgan Masterman	7	280·07	Brunswick ...	Mrs. D. B. Rose ...	6

The list showing the highest producing cow in each unit needs no explanation, but it is worthy of note that five of these leading cows, viz., "Darby," "Queenie," "Sally," "Poppy," and "Creamy," were also the top cows in their respective units last year, and "Poppy," owned by Mr. O. Foan, of Donnybrook, has been the leading cow of that unit for four years.

TABLE 7.
HIGHEST PRODUCING COW IN EACH UNIT.

Owner.	Unit.	Name of Cow.	Tattoo.	Breed.	Test.	Butter Fat.
					%	lb.
Fitzpatrick Bros. ...	Cookernup ...	Darby ...	9C 47	Shorthorn x Jersey	4·53	530·36
C. Piggott ...	Brunswick ...	Belle ...	EQ 1	Jersey ...	5·15	525·53
D. P. Smith ...	Rosa Brook ...	Brown ...	KE 3	Jersey x Guernsey	4·78	493·18
L. Westcott ...	Serpentine ...	Queenie ...	BG 19	Shorthorn x	6·34	483·26
W. J. Burt ...	Metricup ...	Myrtle ...	XH 6	Jersey ...	5·95	480·57
T. A. Fenning ...	Forest Grove	Sally ...	IN 6	Guernsey...	5·50	480·25
Mrs. L. R. Barnsby	Pemberton ...	Biddy ...	JB 8	Jersey x Guernsey	5·40	472·13
D. Strachan ...	Dardanup ...	Beryl ...	FD 33	Jersey ...	4·86	464·24
Mrs. A. G. Eckersley	Harvey ...	Patches ...	DE 35	Jersey ...	5·26	452·31
O. Foan	Donnybrook...	Poppy ...	AL 20	Jersey ...	4·86	441·77
J. E. Murray ...	Manjimup ...	Rosette ...	ME 10	Jersey ...	4·13	435·44
J. Woods ...	Albany ...	Cherry ...	SQ 17	Shorthorn	4·21	433·82
F. Oliver	Northcliffe ...	Creamy ...	WI 4	Guernsey...	4·67	429·06
C. Kruger ...	Pinjarra ...	Warfield ...	C3 K	Jersey ...	5·73	417·29
A. Miller	Cowaramup ...	Buttercup ...	KM 29	Jersey ...	5·73	415·54
G. Farley	Capel	Studie ...	GM 11	Ayrshire ...	3·77	393·11
A. M. Brazier ...	Balingup ...	Pretty ...	HA 59	Shorthorn x	4·94	390·95
W. K. Barnes ...	Benger ...	Dandy ...	OG 19	Guernsey...	4·47	380·58
A. Reid	Bridgetown ...	Mabel ...	TY 13	Jersey ...	4·65	366·47
P. and R. Casselton	Vasse ...	Gwen ...	V9 3	Jersey ...	5·16	363·49

One of the most coveted sets of trophies donated annually by the South-West Co-operative Dairy Farmers, Ltd., is known as the "Sunny West" cups, one of which is awarded, in each of the company's five zones, to the owner of the four highest producing cows completing test during the year. The winners for the year 1940-41 were as follows:—

Zone.	Winner.	Unit.	Butter-fat Average.
			lbs.
1	G. Layman	Donnybrook	402·75
2	H. Eddy	Forest Grove	411·38
3	F. Byrd	Harvey	456·40
4	D. Della	Pemberton	431·89
5	A. M. Brazier	Balingup	355·89

Messrs. Fitzpatrick Bros., of Cookernup, who recorded the second highest production of 456.20 lb., were unfortunate in encountering an even better production in their zone.

TABLE 8.

LEADING HERDS OF LESS THAN 20 COWS.

Owner.	Unit.	No. of Cows.	Breed.	Butter-fat Average.
				lbs.
D. Della	Pemberton	19	Guernsey ...	329·83
E. J. Manning	Harvey	15	Jersey ...	317·34
W. J. Burt	Metricup	19	Jersey ...	296·23
R. Thompson	Pemberton	11	Guernsey ...	294·20
O. Foan	Donnybrook	14	Jersey ...	290·72
A. Bracknell	Albany	14	Shorthorn ...	290·02
G. Scott	Serpentine	14	Friesian ...	287·76
L. Jordan	Albany	16	Shorthorn x Guernsey	285·33
Mrs. O. L. Haddow	Dardanup	14	Jersey ...	284·66

TABLE 9.

LEADING HERDS OF 20–40 COWS.

Owner.	Unit.	No. o Cows.	Breed.	Butter-fat Average.
				lbs.
J. Hartley	Brunswick	34	Jersey ...	328·12
H. Eddy	Forest Grove	26	Jersey ...	312·06
Mrs. L. R. Barnsby	Pemberton	22	Guernsey ...	308·94
N. Ranson	Rosa Brook	30	Jersey ...	302·77
J. H. Iseppi	Cookernup	28	Jersey x Friesian	299·99
Mrs. A. G. Eckersley ...	Harvey	22	Jersey ...	298·11
T. A. Fenning	Forest Grove	26	Jersey and Guernsey	291·92
D. Strachan	Dardanup	28	Jersey ...	287·75
S. R. Aylward	Cookernup	23	Jersey ...	283·98

TABLE 10.

LEADING HERDS OF OVER 40 COWS.

Owner.	Unit.	No. of Cows.	Breed.	Butter-fat Average.
				lbs.
Mrs. D. B. Rose	Brunswick	54	Jersey ...	286·71
Fitzpatrick Bros.	Cookernup	44	Shorthorn ...	276·08
R. A. Clarke	Brunswick	46	Jersey ...	264·44
G. W. Payne & Son	Capel	60	Ayrshire ...	257·26
J. Salerian	Cookernup	51	Jersey ...	257·08

If the above three tables are compared with similar lists published in previous reports, it will be noted that many of the names occur annually, indicating that considerable skill has been utilised in building up the herds to a consistent high standard, and that the owners have successfully practised a definite breeding and feeding policy over a number of years. In the majority of these herds a pure bred bull of high standing has always been used and this, together with rigid and rising culling standards, adequate fodder conservation, suitable feeding and sub-division of paddocks for controlled grazing, has now placed the owners in a position to withstand any reasonable fluctuations of the market or vagaries of the season.

Average Production of all Herds.

Particulars of average butter-fat production in all herds under test during the year are appended hereunder.

Donnybrook "A."	No. of Cows.	Butter-fat Average. lbs.
O. Foan "AL" ...	14	290·72
G. Layman "AU" ...	32	260·42
A. C. Frost "AC" ...	19	254·97
Herd AF*	20	248·14
„ AG*	19	238·54
„ RA	10	233·40
„ RE	17	229·93
„ A–A	20	227·63
„ RJ*	11	222·54
„ AO	34	221·23
„ AA	27	208·44
„ AK	27	197·47
„ RC	16	194·00
„ RY	14	184·67
„ AD	31	181·27
„ A–C	14	174·83
„ AX	32	173·75
„ AA*	15	171·33
„ RY*	17	167·54
„ RX	32	167·35
„ RK	15	151·87
„ A–B	32	123·73

* Letter inverted.

Serpentine "B."	No. of Cows.	Butter-fat Average. lbs.
G. Scott "V" ...	14	287·76
A. W. Middleton "M"	16	266·25
L. Westcott "G" ...	30	264·22
Herd D*	33	237·48
„ O	28	235·11
„ S	26	218·63
„ L	11	213·86
„ K	7	209·50
„ A	68	209·41
„ C	12	205·86
„ T	41	205·80
„ X	16	194·58
„ N	15	184·00
„ W...	14	171·55

* Letter reversed.

Average Production of all Herds—continued.

Cookernup "C."	No. of Cows.	Butter-fat Average. lbs.
J. H. Iseppi "F"* ...	28	299·99
S. R. Aylward "K"*	23	283·98
S. J. Alexander "R"	12	279·10
Herd Q*	34	276·89
,, Y	12	276·73
,, 9C	44	276·08
,, CS	51	257·08
,, E*	27	250·74
,, T	25	224·68
,, Z	19	224·50
,, P	25	221·73
,, Y†	23	220·85
,, F	58	218·75
,, 2C	15	216·93
,, L	24	214·37
,, D	21	213·41
,, A2	36	210·63
,, 7C	53	170·00
,, J	20	164·49
,, Y	46	159·91
,, A1	27	148·85
,, A3	41	114·81

* Letter reversed. † Letter inverted.

Harvey "D."	No. of Cows.	Butter-fat Average. lbs.
E. J. Manning "NH"	15	317·34
Mrs. A. G. Eckersley "E"	22	298·11
F. Byrd "T" ...	30	262·50
Herd C	25	248·10
,, B	32	227·91
,, AY	16	227·19
,, AN	17	225·36
,, B	24	218·43
,, F†	14	204·70
,, AR	16	198·99
,, R†	20	197·33
,, AJ	20	196·44
,, AG	13	192·99
,, AC	24	190·25
,, BA	19	177·42
,, G	35	174·10
,, L†	20	156·68
,, T	21	144·21
,, AD	26	134·70
,, AK	31	133·48
,, CO	25	95·91

† Letter reversed.

Brunswick "E."	No. of Cows.	Butter-fat Average. lbs.
J. Hartley "M"* ...	34	328·12
A. F. Clifton & Co. "Q"	34	298·33
Mrs. D. B. Rose "B"*	54	286·71
Herd P*	17	272·68
,, C*	46	264·44
,, E*	16	264·21
,, A*	23	261·37
,, Q*	20	259·03
,, T*	14	257·51
,, V*	18	250·70
,, D	13	245·01
,, U	36	221·17
,, L*	34	219·46
,, H	30	215·61
,, C	34	205·86
,, X	45	202·79
,, E	30	188·20
,, K*	31	186·49
,, S*	29	162·95
,, T	30	152·87

* Letter inverted.

Dardanup "F."	No. of Cows.	Butter-fat Average. lbs.
D. Strachan "C" ...	28	287·75
Mrs. O. L. Haddow "AB"*	14	284·66
F. Tyrell "A† N" ...	16	279·48
Herd Y†	17	269·44
,, I	15	251·80
,, A† R	13	242·23
,, C*	16	212·25
,, A	18	200·99
,, D	32	198·17
,, A† D†	40	192·24
,, J	15	191·01
,, A† W	34	188·05
,, T†	15	182·06
,, A† U	25	180·83
,, 5	25	180·28
,, AC*	22	177·29
,, A† D	30	177·10
,, W	23	168·20
,, K	35	167·33
,, A† K*	12	150·32
,, A† M	21	126·74

* Letter reversed. † Letter inverted.

Average Production of all Herds—continued.

Capel "G."	No. of Cows.	Butter-fat Average. lbs.
G. W. Payne & Son "X"	60	257·26
G. Farley "M" ...	43	224·42
Norton Bros. "Z" ...	76	196·87
Herd A	60	195·69
„ E*	26	195·11
„ E	47	191·15
„ VT	37	188·23
„ F*	55	183·01
„ Q	40	178·41
„ N	35	176·38
„ J	39	171·72
„ J*	21	168·21
„ D*	71	168·14
„ G*	29	151·77
„ VF	35	142·73
„ VJ	37	117·97

* Letter reversed.

Balingup "H."	No. of Cows.	Butter-fat Average. lbs.
A. T. Meade "Y" ...	19	266·02
A. M. Brazier "A"*	30	265·28
S. C. Maidment "S"	35	249·34
Herd R*	27	235·29
„ C	51	233·71
„ H9	15	231·83
„ J	37	231·14
„ F*	44	220·43
„ K*	45	215·96
„ G*	41	214·88
„ D*	15	214·01
„ B*	29	213·54
„ Q	18	211·27
„ E	25	205·62
„ H4	20	190·98
„ H3	11	178·15
„ F	14	176·51
„ P	23	109·29

* Letter inverted.

Forest Grove "I."	No. of Cows.	Butter-fat Average. lbs.
H. Eddy "U" ...	26	312·06
T. A. Fenning "N" ...	26	291·92
W. Blain "T"* ...	18	274·64
Herd B	13	265·00
„ M	22	251·96
„ W...	15	249·87
„ D	29	244·32
„ P	37	236·21
„ R	14	216·27
„ L	14	214·99
„ Q	14	213·45
„ S	16	202·17
„ Z	20	199·82
„ V	17	194·05
„ F	22	186·99
„ O	19	177·96
„ Y	19	168·29
„ J	19	163·24
„ A	22	160·02
„ X	16	151·67
„ G	15	150·86
„ H	29	142·77
„ K*	16	140·82

* Letter inverted.

Pemberton "J."	No. of Cows.	Butter-fat Average. lbs.
D. Della "N" ...	19	329·83
Mrs. L. R. Barnsby "B"	22	308·94
R. Thompson "AF"	11	294·20
Herd C	20	271·81
„ T	5	248·25
„ U	16	246·98
„ L	19	240·89
„ A	4	237·20
„ R	20	233·94
„ Z	16	226·25
„ V	13	214·50
„ H	8	209·90
„ AM	12	208·76
„ AB	17	198·20
„ Y	16	197·50
„ X	12	196·74
„ F	13	195·54
„ AE	13	189·02
„ AT	14	176·02
„ O	21	139·62
„ AG	16	137·37

Average Production of all Herds—continued.

Rosa Brook "K."	No. of Cows.	Butter-fat Average. lbs.
N. Ranson "A" ...	30	302·77
F. George "Q" ...	19	259·52
F. H. Dennis "F"* ...	15	230·20
Herd C	12	222·74
„ P*	13	216·53
„ Y*	23	213·43
„ U	37	207·20
„ T*	18	199·78
„ D	31	199·76
„ E*	33	193·60
„ B*	29	190·13
„ P	18	186·32
„ A*	12	183·90
„ E	21	181·68
„ J*	16	178·28
„ H	33	177·16
„ Z	17	176·31
„ W	13	147·75
„ G	17	145·31
„ L*	12	138·68
„ V*	21	136·02
„ D*	27	106·16

* Letter inverted.

Vasse "L."	No. of Cows.	Butter-fat Average. lbs.
P. & R. Casselton "9"	19	271·70
T. G. Sansom "OKS"†	14	249·50
W. Lord "U"† ...	19	217·94
Herd P†	22	215·73
„ Y	24	205·14
„ K	19	196·03
„ B	14	194·89
„ C	25	184·95
„ A†	11	183·27
„ V	44	178·91
„ Z†	15	177·49
„ N†	23	174·81
„ D†	17	168·88
„ O	44	162·67
„ E†	16	158·46
„ E*	31	151·18
„ H	8	142·47
„ BB	10	134·58
„ R†	28	130·30
„ F*	15	116·88
„ S†	16	114·71

† Letter "lazy." * Letter reversed.

Manjimup "M."	No. of Cows.	Butter-fat Average. lbs.
M. Kilrain "C" ...	21	276·32
Mrs. M. Young "L"* ...	17	253·13
J. E. Murray "E" ...	16	252·64
Herd B*	29	225·71
„ H	12	223·19
„ K†	14	211·71
„ Q	12	209·79
„ J	13	205·96
„ V	12	201·07
„ P*	9	199·05
„ N	16	186·54
„ T	18	186·09
„ G†	24	184·51
„ M	37	181·45
„ L	18	169·51
„ O	47	162·12
„ P	56	158·53
„ J†	26	154·16
„ Y	29	150·11
„ D*	40	148·47
„ G	16	146·34
„ R	19	146·03
„ A††	28	135·11
„ ZR	14	134·67
„ F*	24	133·09

* Letter reversed. † Letter "lazy."
†† Letter inverted.

Benger "O."	No. of Cows.	Butter-fat Average. lbs.
T. B. Stanley "M" ...	29	253·31
W. K. Barnes "G" ...	33	239·52
L. D. Wilkinson. "X"	21	227·25
Herd Y	14	225·14
„ A	43	212·11
„ L	36	206·58
„	17	190·08
„ W	23	179·96
„ J	27	179·86
„ AJ	17	179·65
„ D	21	176·56
„ C	35	157·84
„ AB	39	157·72
„ AD	10	143·95
„ AF	11	143·17
„ AE	10	139·06
„ E	26	93·33

Average Production of all Herds—continued.

Pinjarra "P."	No. of Cows.	Butter-fat Average. lbs.
J. A. Phillips "X" ...	11	238·54
O. F. H. Bowles "B"	27	237·62
T. M. Smith "J" ...	21	227·30
Herd F*	32	227·23
„ B*	17	226·40
„ A*	37	222·39
„ G	29	215·42
„ A	46	212·65
„ C	5	201·17
„ V*	20	198·25
„ F	18	197·27
„ E*	20	195·39
„ L	15	189·70
„ V	15	162·98
„ P*	24	161·13
„ N	28	157·95
„ K*	18	157·82
„ N*	14	147·69
„ AB	20	143·62
„ U	26	141·97
„ K	21	133·33
„ C*	14	125·34

* Letter inverted.

Bridgetown-Greenbushes "Q."	No. of Cows.	Butter-fat Average. lbs.
H. G. Letchford "X"	16	249·65
A. Reid "Y" ...	23	247·50
J. R. Collins "J" ...	24	207·90
Herd C*	20	202·85
„ A	38	189·54
„ C	37	185·48
„ D	48	179·15
„ S	23	178·36
„ G	21	174·82
„ Y*	14	167·95
„ I	51	166·93
„ T	10	136·60
„ D*	37	134·55
„ E	33	133·91
„ U	29	133·39
„ P	23	115·40
„ Z	26	104·71

* Letter inverted.

Albany "S."	No. of Cows.	Butter-fat Average. lbs.
A. Bracknell "A"* ...	14	290·02
L. Jordan "Q"* ...	16	285·33
J. Woods "Z"* ...	12	250·20
Herd E*	16	243·37
„ J	13	242·89
„ I	18	240·49
„ F*	17	226·28
„ F	17	223·06
„ G*	15	211·88
„ V*	44	207·56
„ E	22	207·30
„ D*	28	202·23
„ P*	25	199·64
„ B*	12	199·20
„ K*	21	194·36
„ B	21	188·40
„ L	27	178·26
„ X	19	171·05
„ U*	25	169·46
„ C*	27	159·34
„ M*	30	134·22
„ R*	15	111·93
„ N*	10	105·99
„ T	32	90·15

* Letter inverted.

Metricup "U."	No. of Cows.	Butter-fat Average. lbs.
W. J. Burt "H" ...	19	296·23
W. B. Blaikie "A" ...	16	271·98
W. Donaldson "V" ...	12	270·46
Herd D*	19	242·84
„ T	8	238·93
„ C*	15	230·03
„ K*	13	229·11
„ I	24	228·28
„ P	20	219·77
„ M	19	210·21
„ N	30	203·79
„ G	19	201·34
„ A*	11	191·06
„ Z	17	179·09
„ G*	22	176·36
„ P*	16	176·27
„ J*	16	166·72
„ Q	10	166·24
„ D	30	164·91
„ L*	11	163·88
„ J	44	159·74
„ B*	12	151·01

* Letter inverted.

Average Production of all Herds—continued.

Northcliffe "W"	No. of Cows.	Butter-fat Average. lbs.
K. Sanders "M" ...	23	270·79
J. Bashford "J" ...	27	258·28
G. Pratt "B" ...	21	242·93
Herd I†	18	225·89
„ C	23	217·50
„ N*	26	216·07
„ A*	28	208·39
„ J*¶	16	200·49
„ R*	16	196·65
„ B*	25	181·51
„ R	22	180·75
„ K*	21	179·21
„ F	29	175·49
„ P	25	174·32
„ U*	24	169·27
„ X	24	168·19
„ S	17	161·47
„ P*	35	140·44
„ E*	19	134·14
„ O	20	126·84
„ L	8	117·72

Cowaramup "X."	No. of Cows.	Butter-fat Average. lbs.
A. Miller "KM" ...	25	278·82
P. O'Farrell "II" ...	19	270·45
Mrs. E. A. Smith "KI"	23	251·72
Herd F*	30	242·61
„ U	24	227·70
„ O	15	225·32
„ IV	10	218·37
„ Y	23	214·96
„ IZ	16	198·73
„ IM	14	193·36
„ IWB	20	188·76
„ IBB	23	183·33
„ Q	20	181·81
„ S	13	179·30
„ L	25	178·60
„ Z	22	170·56
„ KY	15	161·69
„ N	16	161·01
„ IE*	32	158·16
„ IK*	22	149·92

† Letter "lazy." * Letter inverted. * Letter reversed.
¶ Tested 6 months only.

Broom Millet.

There is an opportunity for farmers to supply the market for broom millet in this State at the present time. It is estimated that 50 tons are required annually, the present price being in the vicinity of £45 per short ton.

To supply this demand it has been calculated that approximately 200 acres would have to be planted. Prior to 1925 Australia obtained most of her supply from Europe, particularly from Italy. In 1925 importation was prohibited on account of infestations of the European Corn Borer. Since that year broom corn growing has been stimulated, particularly in New South Wales, to meet the demands of the Australian trade.

In Western Australia a broom millet competition was conducted in 1925-26 by the Department of Agriculture in conjunction with the W.A. Brushware Co. The results showed that relatively good yields were obtained in the south-west portion of the State.

Broom millet is an annual plant belonging to the sorghum group. It is similar in appearance to maize in the young stage and the seed is borne on many fine stems. It is this bunch of fine stems, or "brush," which is the valuable portion of the plant. The seed is useful as stock feed, as is also the stalk of the plant if cut immediately the heads are removed.

The crop grows on summer moist land under conditions similar to those required for maize. Good soil preparation is essential so that a fine seed-bed is obtained. Cultivation is necessary during growth in order to control weeds.

The seed, which costs approximately 6d. per lb., is sown in rows 30 in. to 36 in. apart at the rate of 4 to 6 lbs. per acre in September and October. The resultant crop is ready to harvest in March and April, when the "brush" is cut or broken from the stems, de-seeded and then cured in racks. The cured "brush" is packed in bales of 56 lbs. for market.

Yields per acre range from 4 to 10 cwts. of good, clean "brush," the yield varying according to climatic and soil conditions in the area where the crop is grown.

In the Eastern States 10 cwts. per acre is considered a normal crop.

It is thought this crop may be of value to farmers who have moist summer land for which they require a rotational crop. It is also suitable for growing under irrigation and, like the maize crop, it is on these latter areas it is expected the highest yields would be obtained.

Leaflet No. 201 giving details of cultivation and harvesting is available on application to the Department of Agriculture.

The Official Australian Pure Bred Dairy Cattle Production Recording Scheme.

M. CULLITY, Acting Superintendent of Dairying, and G. SLATER, Recording Officer.

The influence of the exceptionally low rainfall throughout the South-West last year amounting in some cases to as much as 12 inches below the average for the past 50 years, has been reflected in the butter-fat production of cows generally, the average cow tested under grade herd recording conditions yielding 20 lb. less than the previous year, and although handled under better conditions generally the 372 pure bred animals which completed test during the year ended June 30th, 1941, averaged 7.5 lb. of butter-fat lower than the previous year.

Actually, Table 3 overleaf contains 404 productions but as 32 of these animals were tested for less than 150 days, being withdrawn owing to sickness or sale, they have not been included in any of the averages. The remaining 372 animals averaged 6,444 lb. milk with a fat content of 4.63 per cent., equal to 298.38 lb. butter fat without allowances for age.

TABLE 1.

COWS PASSING STANDARD.

Age Class.	A.I.S.		Guernsey.		Jersey.		All Breeds.	
	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.
Mature	47	22	33	20	23	7	103	49
Senior 4 years ...	15	8	1	...	10	3	26	11
Junior 4 „ ...	7	2	6	5	5	3	18	10
Senior 3 „ ...	18	6	10	9	9	4	37	19
Junior 3 „ ...	26	19	12	4	7	6	45	29
Senior 2 „ ...	25	10	7	7	15	9	47	26
Junior 2 „ ...	43	26	24	13	29	18	96	57
Totals ...	181	93	93	58	98	50	372	201
Per cent. Passing Standard ...	51·4		62·4		51·0		54·0	

The percentage of cows passing their respective standard has shown a slight decline over last year's figures, and is particularly noticeable in the Guernsey and Jersey breeds. It is pleasing to note, however, that the percentage of heifers passing is higher than for some years, and with the promise of a good season during 1941-42 increased yields may be expected.

Table 2.

AVERAGE BUTTER-FAT PRODUCTION IN EACH CLASS.

Age Class.	A.I.S.		Guernsey.		Jersey.		All Breeds.	
	No. of Cows.	Average Butter-fat.	No. of Cows.	Average Butter-fat.	No. of Cows.	Average Butter-fat.	No. of Cows.	Average Butter-fat.
		lb.		lb.		lb.		lb.
Mature	47	357·03	33	391·16	23	336·47	103	363·40
Senior 4 years ...	15	294·60	1	310·16	10	284·36	26	291·26
Junior 4 „ ...	7	258·08	6	343·21	5	330·08	18	306·46
Senior 3 „ ...	18	273·21	10	344·29	9	271·08	37	291·90
Junior 3 „ ...	26	305·75	12	246·17	7	309·53	45	290·50
Senior 2 „ ...	25	266·50	7	335·74	15	255·99	47	273·46
Junior 2 „ ...	43	254·58	24	260·75	29	240·16	96	249·68

Table 2 indicates poor butter-fat averages in the four-year old classes, the average yield of senior four-year old cows being nearly 40 lbs. below the standard. For many years this has been a low producing class, but may be due this year to the strain of calving for three years and producing under adverse seasonal conditions during the second and third lactation periods.

The individual yields shown in Table 3 indicate plainly the value of adequate feeding, as the breeders whose names appear most frequently at or near the top of the lists are men who endeavour to feed according to production, whilst in many cases failure to reach a reasonable standard is due more to under-feeding than inherent low capacity for production. An example of scientific feeding has been provided again this year by Mr. A. W. Padbury of Koojan, whose cows "Koojan Ideal's Daphne" (489.13 lb. butter-fat) and "Koojan Ace's Jewel 2nd" (801.16 lb. butter-fat) set new records for the junior two-year old and mature classes respectively, and his American imported bull "Homestead Ace" was again champion herd sire. This is the fourth year in succession that this Guernsey bull has earned the title of champion, his six leading daughters averaging 581.80 lb. of butter-fat, or 597.90 lb. with age allowances, the best average recorded to date in this State.

Another record of 18 years' standing was decisively broken during the year by Messrs. D. Bevan & Sons' senior two-year old A.I.S. cow "Glanavon Tiny 5th," which yielded 13,530 lb. of milk at an average test of 4.30 per cent., equal to 581.95 lb. of butter-fat in 273 days, thus breaking the record held by Mr. R. H. Rose's "Jean 2nd of Grass Vale" by 73 lbs. of butter-fat. This production is also a State milk record for senior two-year old cows.

Detailed results, in order of merit, are given in Table 3.

TABLE 3.

COWS WHICH COMPLETED TEST DURING TWELVE MONTHS ENDED 30TH JUNE, 1941.

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk Last day of Test.	Weight of Milk for period.	Average Test.	Weight of Butter-Fat for period.	Owner.	Sire.
						lb.	lb.	%	lb.		
COWS UNDER 2½ YEARS—STANDARD 230 LBS. BUTTER-FAT.											
Koojan Ideal's Daphne	Guernsey	7250	3-10-37	20-11-39	273	32·5	8,821	5·54	489·13	A. W. Padbury	Glenburnie Ideal (2548)
Glanavon Rosina	A.I.S.	....	3-5-37	13-10 39	273	27	9,231	4·77	440·63	D. Bevan & Sons ..	Blacklands Jean's Supreme (1871)
Koojan Ideal's Delphinium	Guernsey	8809	13 9 38	1-9-40	273	29	8,262	5·23	431·97	A. W. Padbury	Glenburnie Ideal (2548)
Muresk Gloria	do.	7636	28-5 38	8-5-40	273	22	8,136	5·26	426·84	Muresk Agricultural College	Muresk Homestead (2075)
Capel Princess 3rd	A.I.S.	....	14-7-38	29-9-40	273	26	10,713	3·79	406·07	B. W. Prowse	Capel Star King (4672)
Glanavon Dahlia 7th	do.	....	23-3-38	26-9-40	273	21	9.303	4·29	398·82	D. Bevan & Sons	Glanavon Neptune (3959)
Koojan Ideal's Jewel	Guernsey	....	14-4-38	17-3-40	273	23·5	77,06	5·01	385·81	A. W. Padbury	Glenburnie Ideal (2548)
Capel Lottie	A.I.S.	....	5-8-38	22-7-40	273	27·5	9.503	3·84	365·33	B. W. Prowse	Leyland's Reward (3331)
Travalgan Starbright 6th	Jersey	74242	31-5-38	28-5-40	273	17	6,591	5·34	352·04	Robinson Bros.	Glen Iris Golden Oxford (12694)
Glanavon Empress 2nd	A.I.S.	....	5-7-38	11-9-40	273	22	7.866	4·24	333·47	D. Bevan & Sons ..	Blacklands Jean's Supreme (1871)
Tipperary Beauty 6th	do.	28217	8-8-38	25-9-40	273	30	7,230	4·52	327·01	W. G. Burges	Newstead Tourist (3419)
Wooroloo Mary	do.	28651	21-11-37	3-3-40	273	23	7.449	4·21	313·30	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Tipperary Dove 10th	do.	28220	25-3-38	6-4-40	273	18	7.474	4·17	311·51	W. G. Burges	Blacklands Monarch's Commander (1877)
Capel Pretty Star	Jersey	....	20-7-38	18-8 40	273	19	6.462	4·73	305·83	B. W. Prowse	Juadine Sunlight (15704)
Travalgan Starbright 5th	do.	74241	30-5-38	11-6-40	273	14	5,352	5·67	303·28	Robinson Bros.	Glen Iris Golden Oxford (12694)
Glanavon Cowslip 5th	A.I.S.	....	27-10-38	7-7-40	273	23	6,969	4·32	300·94	D. Bevan & Sons	Parkview Commodore (306)
Westby Lupin 10th	do.	28525	1-8-37	2-10-39	273	20	7,170	4·14	296·94	Burkitt & Brown	Telyarup Duke (956)
Muresk Guiniviere	Guernsey	7638	15-5-38	31-3-40	273	17·5	5.483	5·39	295·38	Muresk Agricultural College	Denmark Auric (3313)
Juadine Peerless Lily 13th	Jersey	....	20-12-38	21-9-40	273	13·5	4,736	6·16	291·94	Miss L. Hancock ..	Austral Park Wonderful Lad (12423)
Juadine Peerless Lily 10th	do.	71998	27-12-37	25-5 40	273	12·5	4,658	6·18	287·99	Miss L. Hancock	Selsey Hall Boy (15136)
Wykeham Sparkle	do.	....	5-7-38	4-7-40	273	12·5	4,516	6·37	287·51	H. A. Smith	Greenmount Bell's Bonetienne (15639)
Wattle Creek Betty	A.I.S.	28485	18-10-38	19-8-40	273	21	7,933	3·61	286·35	E. T. Thatcher ..	Yanget Autumn Sun (3630)
Denmark Pink Rose	Guernsey	6969	24-7-38	30-8-40	273	15	5,145	5·56	285·77	Denmark Research Station	Denmark Auric (3313)
Wattle Creek Reddy	A.I.S.	28495	18-10-37	20-3-40	273	18	6,594	4·29	282·98	E. T. Thatcher	Yanget Autumn Sun (3630)
Glanavon Rosina 2nd	do.	....	17-9-38	20-7-40	273	22	7,266	3·88	282·23	D. Bevan & Sons	Glanavon Golden Boy (4830)
Coogely Jonquil	Guernsey	6945	1-11-37	29-4-40	273	12	4,746	5·86	277·93	Denmark Research Station	Coogely Judy's Goldmine (2621)
Grass Vale Twylish Lady	Jersey	....	14-10-38	17-9 40	273	19·5	5.459	5·08	277·61	R. H. Rose	Grass Vale Gold Boy (14684)
Narrogin Mabel	A.I.S.	26810	25-11-37	27-4-40	273	24	7,242	3·82	276·58	Narrogin School of Agriculture	Wooroloo Stirling 3rd (3626)
Lansdowne Doreen	Guernsey	7266	24-6-37	8-10-39	273	13	5.349	5·16	276·31	J. R. Giles	Koojan Ace's Romancer (3436)
Glanavon Picture 4th	A.I.S.	25189	16-7-37	15-10-39	273	26	6,978	3·93	274·93	D. Bevan & Sons	Parkview Commodore (306)
Travalgan Lady Eion 4th	Jersey	74240	28-8-38	27-6-40	273	16	5,178	5·31	274·83	Robinson Bros.	Glen Iris Golden Oxford (12694)

Narrogin Connie	A.I.S.	....	25-8-38	21-8-40	273	14	5,502	4·89	268·72	Narrogin School of Agriculture	Brackenhurst Conquest (4624)
Wooroloo Wendy	do.	28660	2-10-37	25-1-40	273	21	6,693	4·00	268·61	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Claremont Mabel 12th	do.	24423	18-10-37	7-4-40	273	24	6,867	3·91	268·47	Claremont Hospital for Insane	Claremont Herdsman (968)
Rosy Hill Silvermine 3rd	Jersey	....	21-6-38	26-9-40	273	18·5	5,591	4·79	267·87	M. T. Padbury .	Rosy Hill Pearl's Emblem
Congelin Happy Days 2nd	do.	..	17-4-38	21-3-40	273	12	5,571	4·76	265·00	B. P. Hack	Rosecliff Marchalong (15094)
Glanavon Actress	A.I.S.	...	27-5-38	20-7-40	273	22	6,936	3·82	264·88	D. Bevan & Sons ...	Parkview Commodore (306)
Rosy Hill Pearl 11th	Jersey	....	10-8-38	23-8-40	273	13	5,199	5·05	262·50	M. T. Padbury	Garden Hill Mint's Superior (15582)
Wooroloo Joy 4th	A.I.S.	28468	6-7-38	17-9-40	273	13	5,589	4·70	262·46	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Juadine Juliet 10th	Jersey	....	12-3-38	10-8-40	273	8·5	4,931	5·31	261·68	Miss L. Hancock ..	Austral Park Wonderful Standard (12423)
Lansdowne Cream Sox	Guernsey	7263	19-9-37	8-10-39	273	12	4,896	5·32	260·72	J. R. Giles	Koojan Ace's Romancer (3436)
Claremont Whitby Maid 31st	A.I.S.	....	7-2 38	9-6 40	273	19	6,702	3·83	256·54	Claremont Hospital for Insane	Claremont Herdsman (968)
Denmark Golden Glory	Guernsey	6965	13 5-38	25 6-40	273	12	4,896	5·18	254·04	Denmark Research Station	Denmark Damon (2519)
Brackenhurst Dairy Maid 2nd	A.I.S.	...	27-5-38	6-8-40	273	22	8,046	3·15	253·92	B. W. Prowse .	Wooroloo Duke 2nd (472)
Lansdowne Boronia	Guernsey	7262	28-4-38	26-6-40	273	13	4,989	5·02	250·91	J. R. Giles	Koojan Ace's Romancer (3436)
Congelin Rose Marie 3rd	Jersey	...	9-3-38	6-4-40	273	14	4,857	5·12	248·70	B. P. Hack	Rosecliff Marchalong (15094)
Garden Hill Linda	do.	71350	23 4 37	28-9-39	273	13	4,224	5·88	248·35	W. Padbury	Clarendon Eyre Golden Oxford (13606)
Denmark Mary Rose	Guernsey	6966	7-7-38	7-7 40	273	11	3,813	6·50	248·01	Denmark Research Station	Denmark Auric (3313)
Wykeham Juliet	Jersey	....	24-6-38	23-7-40	273	9·5	4,507	5·50	247·09	H. A. Smith	Greenmount Bell's Bonetienne (15639)
Tipperary Dove 12th	A.I.S.	28222	10-8-38	4-10-40	273	14	5,622	4·33	243·37	W G. Burgess	Newstead Tourist (3419)
Claremont Biddy 38th	do.	24400	20-9 37	27-11-39	273	19	5,862	4·12	241·30	Claremont Hospital for Insane	Wooroloo Triumph 4th (3627)
Crantock Primula's Tulip	Jersey	70900	15-3-38	15-12-39	240	11·5	4,590	5·17	237·09	Mrs. G. H. Burnside	Congelin Eminent's Golden (13623)
Crantock Cream Countess	do.	....	20-8-38	10-5-40	273	10	4,257	5·47	233·97	Mrs. G. H. Burnside . .	Crantock Blonde Napoleon (8207)
Grass Vale Golden Eve	do.	....	23-6-38	6-9-40	240	11	4,673	4·97	232·59	R. H. Rose ..	Grass Vale Gold Boy (14682)
Lansdowne Guardian's Bonny	Guernsey	8830	5-12-38	7-7-40	273	15	4,815	4·79	230·65	J. R. Giles	Koojan Ace's Guardian (3432)
Claremont Biddy 39th	A.I.S.	....	31-3-38	10-7-40	273	15	6,038	3·82	230·48	Claremont Hospital for Insane	Wooroloo Jean 2nd's Guardian (4488)
Claremont Poppy 11th	do	24434	16-6-37	2-12-39	273	21	6,048	3·80	230·01	Claremont Hospital for Insane	Wooroloo Triumph 4th (3627)
Murray Anne	Guernsey	7653	28-6-38	7-8-40	273	13	4,531	5·06	229·36	P. G. Hampshire	Drakesbrook Larwood (4032)
Wendowie Jaunty	do.	8083	29-9-37	6-11-39	273	11	4,413	5·17	228·27	S. F. Russell . ..	Muresk Golden Chief (2925)
Narrogin Cherry	A.I.S.	26809	28-1-38	24-3-40	273	17	5,391	4·22	227·41	Narrogin School of Agriculture	Wooroloo Stirling 3rd (3626)
Claremont Cocky 15th ..	do.	....	3-5-38	27-8-40	273	13	5,589	4·06	227·12	Claremont Hospital for Insane	Wooroloo Jean 2nd's Guardian (4488)
Claremont Maggie 10th	do.	....	17-1-38	14-6 40	273	14	5,472	4·13	226·00	Claremont Hospital for Insane	Wooroloo Jean 2nd's Guardian (4488)
Claremont Cocky 13th	do.	.	28-11-37	25-5-40	273	16	5,718	3·94	225·31	Claremont Hospital for Insane	Wooroloo Triumph 4th (3627)
Narrogin Star 20th	do.	....	12-7-38	25-8-40	273	15	5,880	3·80	223·56	Claremont Hospital for Insane	Wooroloo Stirling 3rd (3626)
Lansdowne Ida	Guernsey	7267	12-10-37	20-12-39	273	14	5,082	4·38	222·91	J. R. Giles	Glenburnie Ideal (2548)
Brookfields Queen 4th	do.	6841	22-3-38	26-8-40	273	10·5	4,577	4·79	219·31	P. G. Hampshire ..	Brookfields Baron (3936)
Juadine Jewel	Jersey	....	9-10-38	5-10-40	273	10·5	4,442	4·89	217·34	Miss L. Hancock ...	Austral Park Wonderful Standard (12423)

HERD TESTING—*continued.*

COWS UNDER 2½ YEARS—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk Last day of Test.	Weight of Milk for period.	Average Test.	Weight of Butter-Fat for period.	Owner.	Sire.
						lb.	lb.	%	lb.		
Murray Judy	Guernsey	9119	15-8-38	21-7-40	240	11	3,900	5·49	214·23	R. J. Giles	Drakeswood Larwood (4032)
Coogely Bellona	do.	8508	15-6-38	16-3-40	273	13	3,909	5·47	213·32	Denmark Research Station	Coogely Myrtle's Prince (4769)
Kapara Sparkle 2nd	Jersey	....	12-9-38	27-8-40	273	12	4,341	4·87	211·45	D. Bradford	Congelin Mandarin (14542)
Wooroloo Hope	A.I.S.	23248	11-8-37	13-10-39	240	10	4,905	4·29	210·30	Wooroloo Sanatorium Farm	Wooroloo Duke 6th (3622)
Claremont Cleggett 13th	do.	24409	18-4-37	2-12-39	273	10	4,740	4·38	207·85	Claremont Hospital for Insane	Wooroloo Triumph 4th (3627)
Juadine Peerless Lily 11th	Jersey	71999	27-1-38	29-4-40	273	10·5	3,647	5·65	206·15	Miss L. Hancock	Selsey Hall Boy (15136)
Lansdowne Joyce 2nd	Guernsey	7268	1-5-38	20-7-40	240	14	4,530	4·53	205·02	J. R. Giles	Koojan Ace's Romancer (3436)
Brackenhurst Gem	A.I.S.	24047	3-6-37	25-9-39	240	10·5	5,145	3·95	203·31	R. J. Morgan	Thornleigh Champagne (930)
Congelin Sparkle 2nd	Jersey	....	7-5-38	2-5-40	240	15	4,928	4·11	202·50	B. P. Hack	Rosecliff Marchalong (15094)
The Wold Fairy Daisy 2nd	do.	....	21-6-38	6-5-40	273	8·5	3,431	5·86	201·13	L. C. Field	Grantham Fairy King (13765)
Congelin Viola	do.	....	26-10-37	15-3-40	273	10	3,683	5·35	196·91	B. P. Hack	Rosecliff Marchalong (15094)
Greenmount Charming Queen 2nd	do.	71652	16-3-38	25-11-39	210	19	3,915	4·86	190·32	A. J. B. Strempel	Bellefaire Bonaparte's Bonetienne (9224)
Claremont Mabel 13th	A.I.S.	....	31-3-38	2-9-40	273	12	4,446	4·25	188·93	Claremont Hospital for Insane	Wooroloo Jean 2nd's Guardian (4488)
Claremont Whitby Maid 32nd	do.	....	7-3-38	2-6-40	273	9	4,685	4·02	188·27	Claremont Hospital for Insane	Claremont Max Hero (3802)
Crantock Napoleon's Petunia	Jersey	....	19-6-38	10-5-40	240	13	3,720	4·86	180·90	Mrs. G. H. Burnside	Crantock Blonde Napoleon (8207)
Glanavon Vida 3rd	A.I.S.	....	19-5-39	21-9-40	180	11·5	4,485	3·92	175·86	Burkitt & Brown	Parkview Commodore (306)
Rosella Bonnie Lass	Guernsey	9309	10-10-38	4-8-40	273	7	3,735	4·70	175·67	W Darnell	Brookfields Baron (3936)
Rosy Hill Silvermine 4th	Jersey	....	17-7-38	30-8-40	150	21	3,660	4·54	166·26	M. T. Padbury	Garden Hill Mint's Superior (15582)
Rosella Lady Luck	Guernsey	9313	28-7-38	19-7-40	273	5·5	3,137	5·31	165·64	W. Darnell	Brookfields Baron (3936)
Yanget Modesty 3rd	A.I.S.	....	30-9-38	8-9-40	210	17	4,335	3·70	161·45	A. E. Grant	Blacklands Lancer (1874)
The Wold Fairy Mooltha	Jersey	....	23-6-38	12-7-40	210	8	3,150	4·96	156·48	L. C. Field	Grantham Fairy King (13765)
Brackenhurst Duke's Ada	A.I.S.	....	29-6-38	31-7-40	240	6	4,170	3·72	155·01	R. J. Morgan	Wooroloo Duke 2nd (472)
The Wold Fairy Pride	Jersey	....	15-4-38	12-7-40	210	7	2,865	5·21	149·19	L. C. Field	Grantham Fairy King (13765)
Rosella Joy	Guernsey	3911	10-7-38	17-8-40	240	5·5	2,790	5·32	148·44	W. Darnell	Brookfields Baron (3936)
Yanget Della 4th	A.I.S.	....	8-10-38	21-8-40	210	10	3,435	3·89	133·65	A. E. Grant	Blacklands Lancer (1874)
Brackenhurst Champagne's Treasure	do.	....	4-6-38	20-10-40	210	8·5	3,075	4·14	127·25	R. J. Morgan	Thornleigh Champagne (930)
Lansdowne Golden Hope 5th	Guernsey	8828	16-1-39	9-11-40	150	14	2,460	4·97	122·25	J. R. Giles	Koojan Ace's Romancer (3436)
Grass Vale Molly's Maid	Jersey	....	6-8-38	6-9-40	120	15	2,610	4·60	119·88	R. H. Rose	Grass Vale Gold Boy (14684)
Brackenhurst Lily	A.I.S.	....	8-12-38	18-10-40	210	9·5	2,685	3·66	98·18	R. J. Morgan	Brackenhurst Violet's Champagne 2nd (4625)
Brackenhurst Fendant	do.	....	10-11-38	25-10-40	150	7	2,190	3·71	81·36	R. J. Morgan	Brackenhurst Violet's Champagne 2nd (4625)
Garden Hill Mint	Jersey	20876	23-3-38	30-8-40	90	11·5	1,365	5·52	75·29	W. Padbury	Rosy Hill Perfection (14173)
Koojan Princess Juliana	Guernsey	8804	17-4-39	31-1-41	60	19	1,260	5·04	63·48	A. W. Padbury	Glenburnie Ideal (2548)
Glanavon Mayflower 2nd	A.I.S.	....	1-8-38	13-1-41	60	23	1,620	3·67	59·52	D. Bevan & Sons	Parkview Commodore (306)

Yanget Myrtle 2nd	do.	....	5-5-38	20-9-40	120	6	1,020	4·51	46·02	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Claremont Star 19th ..	do.	....	23-1-38	7-5-40	60	18	1,140	3·48	39·84	Claremont Hospital for Insane	Claremont Herdsman (968)
Muresk Helen	Guernsey	9108	26-7-38	8-7-40	30	24	720	4·48	32·22	Muresk Agricultural College	Muresk Homestead (2075)

COWS 2½ YEARS AND UNDER 3 YEARS—STANDARD 250 LBS. BUTTER-FAT.

Glanavon Tiny 5th	A.I.S.	....	23-10-37	29-6-40	273	40	13,530	4·30	581·95	D. Bevan & Sons	Parkview Commodore (306)
Glanavon Gold 4th	do.	....	19-10-37	26-7-40	273	29	9,267	4·88	452·20	D. Bevan & Sons	Glanavon Neptune (3959)
Denmark Petal	Guernsey	6968	4-10-37	25-7-40	273	20	7,500	5·61	420·90	Denmark Research Station	Koojan Golder Prosper (2283)
Koojan Bo-peep 2nd	do.	7246	2-4-37	21-3-40	273	21	7,473	5·56	415·19	A. W. Padbury	Koojan Ace's Aristocrat (2730)
Muresk Sultana	do.	7650	6-7-37	14-2-40	273	24	7,482	5·12	383·08	Muresk Agricultural College	Koojan Ace's Gold Seeker (3431)
Wooroloo Heather	A.I.S.	23247	5-11-37	2-8-40	273	22	8,796	4·15	365·40	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Muresk Joyous	Guernsey	7642	9-5-37	28-4-40	273	21	6,551	5·38	352·41	Muresk Agricultural College	Koojan Ace's Gold Seeker (3431)
Travalgan Starbright 4th	Jersey	69418	26-10-37	10-6-40	273	17	5,886	5·88	346·04	Robinson Bros.	Glen Iris Golden Oxford (12694)
Wattle Creek Venus 2nd	A.I.S.	28501	28-8-37	29-4-40	273	27	8,601	3·91	336·48	E. T. Thatcher	Yanget Autumn Sun (3630)
Travalgan Lady Mint 6th	Jersey	69416	3-8-37	22-5-40	273	13	5,079	6·09	309·53	Robinson Bros.	Travalgan Northern Noble (10124)
Glanavon Venus 3rd	A.I.S.	....	15-12-37	1-7-40	273	19	6,597	4·67	308·04	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Crantock Napoleon's Daffodil	Jersey	....	22-10-37	12-8-40	273	10·5	5,252	5·74	301·38	Mrs. G. H. Burnside	Crantock Blonde Napoleon (8207)
Wooroloo Dainty	A.I.S.	23235	31-3-37	22-10-39	273	23	6,639	4·43	293·85	Wooroloo Sanatorium Farm	Wooroloo Duke 6th (3622)
Congelin Iolanthe 3rd	Jersey	70821	10-6-37	20-4-40	240	17	6,300	4·66	292·65	B. P. Hack	Clarendon Eyre Eminent's Geishar 4th (13597)
Namder Delia	do.	....	6-10-37	26-8-40	273	14	5,802	5·03	291·65	H. S. Redman	Crantock Starbright's Napoleon (14551)
Wattle Creek Bell	A.I.S.	28484	27-8-37	5-4-40	273	23	7,719	3·71	286·10	E. T. Thatcher	Yanget Autumn Sun (3630)
Crantock Golden Bell	Jersey	70896	13-8-37	16-8-40	273	6	5,193	5·47	284·00	Mrs. G. H. Burnside	Congelin Eminent's Golden (13623)
Glanavon Pansy 4th	A.I.S.	....	10-11-37	8-9-40	273	18	6,921	4·07	281·64	Burkitt & Brown	Blacklands Jean's Supreme (1871)
Crantock Eminent's Starlight	Jersey	70894	20-1-37	17-12-39	273	12	5,286	5·19	274·44	Mrs. G. H. Burnside	Congelin Eminent's Golden (13623)
Grass Vale Design's Nora	do.	71638	8-8-37	4-7-40	273	10·5	4,690	5·81	272·45	R. H. Rose	Belgonia Design's Prince (14422)
Claremont Cherry 13th	A.I.S.	24404	17-6-37	1-4-40	273	18	6,324	4·28	270·48	Claremont Hospital for Insane	Wooroloo Triumph 4th (3627)
Brookfields Morden Lady 3rd	Guernsey	6839	27-9-37	6-7-40	273	15	5,595	4·78	267·95	P. G. Hampshire	Koojan Ace's Majestic (2735)
Tipperary Fairy 4th	A.I.S.	28223	27-11-37	5-9-40	273	7	5,991	4·38	262·37	W. G. Burges	Blacklands Monarch's Commander (1877)
Brookfields Betty	Guernsey	6833	30-10-37	8-8-40	273	12	5,474	4·72	258·27	P. G. Hampshire	Brookfields Majesty (3254)
Grass Vale Golden Cream 16th	Jersey	71639	28-8-37	7-8-40	273	10·5	5,597	4·52	253·04	R. H. Rose	Belgonia Design's Prince (14422)
Brookfields Bess	Guernsey	6832	8-9-37	20-5-40	273	11	4,713	5·35	252·35	P. G. Hampshire	Koojan Ace's Gold Seeker (3431)
Claremont Maggie Morrison 24th	A.I.S.	24429	8-9-37	19-8-40	273	18	6,324	3·94	249·31	Claremont Hospital for Insane	Wooroloo Triumph 4th (3627)
Grass Vale Design's Maggie	Jersey	71637	25-11-37	25-7-40	273	11	4,818	5·16	248·49	R. H. Rose	Grass Vale Gold Boy (14684)
Claremont Whitby Maid 29th	A.I.S.	24451	12-7-37	19-4-40	273	19	5,787	4·26	246·62	Claremont Hospital for Insane	Claremont Herdsman (968)
Claremont Bell 22nd	do	....	20-1-38	18-9-40	273	17	6,051	4·06	245·79	Claremont Hospital for Insane	Claremont Max Hero (3802)
Claremont Biddy 36th	do.	24398	22-4-37	7-4-40	273	12	5,646	4·32	243·97	Claremont Hospital for Insane	Claremont Herdsman (968)
Claremont Biddy 37th	do.	24399	11-6-37	21-3-40	273	15	6,195	3·92	242·86	Claremont Hospital for Insane	Wooroloo Persimmon (2972)
Claremont Beanie 8th	do.	24390	11-7-37	24-8-40	273	18	6,369	3·74	237·94	Claremont Hospital for Insane	Claremont Herdsman (968)

HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk Last day of Test.	Weight of Milk for period.	Average Test.	Weight of Butter-Fat for period.	Owner.	Sire.
						lb.	lb.	%	lb.		
COWS 2½ YEARS AND UNDER 3 YEARS—*continued.*											
Congelin Iolanthe 2nd	Jersey	70820	7-6-37	27-4-40	240	12	4,253	5·55	236·27	B. P. Hack	Clarendon Eyre Eminent's Geishar 4th (13597)
Claremont Pinafore 8th	A.I.S.	.. .	28 10-37	20-7-40	273	16	6,010	3·74	225·03	Claremont Hospital for Insane	Claremont Herdsman (968)
Claremont Maggie Morrison 26th	do.	....	21-12-37	25-7-40	273	15	5,905	3·81	224·65	Claremont Hospital for Insane	Wooroloo Jean 2nd's Guardian (4488)
Claremont Blossom 25th	do.	....	21-10-37	14-8-40	273	10	5,580	3·93	219·39	Claremont Hospital for Insane	Claremont Herdsman (968)
Congelin Tangerine 2nd	Jersey	....	30-8-37	10-5-40	210	16	4,395	4·87	214·10	B. P. Hack	Rosecliff Marchalong (15094)
Claremont Beauty 14th	A.I.S.	24392	10 9-37	9-4-40	273	14	5,285	3·91	206·88	Claremont Hospital for Insane	Claremont Herdsman (968)
Claremont Mabel 11th	do.	24422	29-8-37	20 4-40	180	22·5	4,935	4·06	200·46	Claremont Hospital for Insane	Claremont Max Hero (3802)
The Wold Starbright Oxford	Jersey	....	31-5-37	16-5-40	240	8	3,585	5·56	199·53	L. C. Field	Clarendon Eyre Oxford Pioneer (11484)
Yanget Victress 2nd	A.I.S.	....	22 10-37	5-8-40	273	15	4,695	4·09	192·14	A. E. Grant	Blacklands Lancer (1874)
Westby Dahlia	do.	28524	17-9-37	28-8-40	210	9	5,745	3·34	192·09	Burkitt & Brown	Telyarup Duke (956)
Claremont Maggie Morrison 25th	do.	....	4-10-37	7 6-40	273	11	4,968	3·83	191·46	Claremont Hospital for Insane	Claremont Max Hero (3802)
Garden Hill Fern 3rd	Jersey	....	26-1-38	25-11-40	180	18	3,450	5·00	172·38	W. Padbury	Rosy Hill Perfection (14173)
Crantock Golden Cream 3rd	do.	....	30-5-37	17-3-40	150	18	2,835	5·09	143·91	Mrs. G. H. Burnside	Crantock Blonde's Napoleon (8207)
Crantock Starbright Napoleonette 2nd	do.	70902	5-7-37	5-4-40	120	19	2,460	4·87	119·85	Mrs. G. H. Burnside	Crantock Blonde's Napoleon (8207)
Coogely Bellona	Guernsey	8508	15-6-38	10-3-41	90	20	2,040	5·81	118·44	Denmark Research Station	Coogely Myrtle's Prince (4769)
Brackenhurst May	A.I.S.	....	10-1-38	19-12-40	150	13	2,805	3·75	105·35	R. J. Morgan	Brackenhurst Gibson's Champagne 2nd (3757)
Lansdowne Lady Morden	Guernsey	7269	30-9-37	8-7-40	30	18	540	4·57	24·66	J. R. Giles	Koojan Ace's Romancer (3436)
COWS 3 YEARS AND UNDER 3½ YEARS—STANDARD 270 LB. BUTTER-FAT.											
Tipperary Dove 5th	A.I.S.	22902	20-8-36	20-11-39	273	39	10,302	4·45	458·51	W. G. Burges . .	Blacklands Monarch's Commander (1877)
Glanavon Melba	do.	25185	21-12-36	16-3-40	273	37	11,631	3·85	438·11	D. Bevan & Sons	Parkview Commodore (306)
Glanavon Doris 5th	do.	25170	5-12-36	12-12-39	273	39	9,387	4·52	424·09	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Glanavon Lulu	do.	25183	25-10-36	31-1-40	273	30	9,300	4·54	422·41	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Wooroloo Jeanette 2nd	do.	23250	1-8-36	11-10-39	273	27·5	9,668	4·25	411·47	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Tipperary Fairy 3rd	do.	22905	1-9-36	1-11-39	273	26	9,438	4·28	403·58	W. G. Burges	Blacklands Monarch's Commander (1877)
Muresk Opal	Guernsey	7646	27-8-36	12-2-40	273	26	7,668	5·14	394·07	Muresk Agricultural College	Minnamurra Plaintiff (1318)
Glanavon Florrie	A.I.S.	25177	24-2-37	9-5-40	273	23	9,519	4·09	390·14	D. Bevan & Sons	Glanavon Nimrod (437)

Rosy Hill Pearl 10th	Jersey	....	1-6-37	14-7-40	273	19	6,972	5·51	383·96	M. T. Padbury	Glen Iris Star (9492)
Glanavon Gold 3rd	A.I.S.	25181	24-8-36	19-10-39	273	32	9,246	4·14	383·17	D. Bevan & Sons ..	Glanavon Le Nayler (3201)
Denmark Dawn Childe	Guernsey	6962	14-5-37	2-7-40	273	15	6,285	5·82	366·04	Denmark Research Station	Wollongbar Reformer (538)
Wooroloo Dainty 2nd	A.I.S.	28634	17-2-37	2-7-40	273	24	8,892	4·09	363·45	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Denmark Briar Rose	Guernsey	6959	15-8-37	29-9-40	273	20	6,600	5·40	356·69	Denmark Research Station	Denmark Illustrious (3320)
Wattle Creek Rosie	A.I.S.	28498	1-3-37	21-8-40	273	20	8,130	4·19	340·83	E. T. Thatcher	Yanget Autumn Sun (3630)
Wooroloo Sunbeam	do.	23273	24-10-36	30-3-40	273	8	7,779	4·23	329·24	Wooroloo Sanatorium Farm	Wooroloo Triumph 4th (3627)
Glanavon Daphne 3rd	do.	25165	13-2-37	13-6-40	273	13	8,274	3·94	325·78	Burkitt & Brown	Parkview Commodore (306)
Juadine Heroine	Jersey	67232	27-6-36	19-10-39	273	12	7,027	4·57	321·32	Miss L. Hancock	Mokine Repulse (5867)
Crantock Eminent's Sunshinette	do.	70895	7-1-37	14-3-40	273	22	6,216	4·97	309·32	Mrs. G. H. Burnside .	Congelin Eminent's Golden (13623)
Glanavon Dahlia 5th	A.I.S.	25163	18-11-36	6-1-40	273	22	7,506	4·07	304·98	D. Bevan & Sons	Parkview Commodore (306)
Crantock Silk Socks	Jersey	70901	6-6-37	26-6-40	273	10	5,625	5·38	302·61	Mrs. G. H. Burnside	Congelin Eminent's Golden (13623)
Mokine Heroine 12th	do.	....	15-5-37	20-8-40	273	11·5	6,358	4·73	300·75	H. A. Smith	Juadine Chieftain (14759)
Wattle Creek Vera	A.I.S.	28502	10-10-36	23-1-40	273	11	6,993	4·26	297·88	E. T. Thatcher	Wooroloo Duchess' Guardian (3621)
Wooroloo Betty 5th	do.	23232	8-1-37	28-1-40	273	26	6,978	4·21	294·45	Wooroloo Sanatorium Farm	Triumph of Pine Creek (2515) (A.M.S.)
Wooroloo Doris	do.	23239	4-2-37	2-8-40	273	14	6,192	4·69	290·46	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Garden Hill Fern 2nd	Jersey	61643	11-10-36	14-4-40	273	15	5,205	5·58	290·38	W. Padbury	Glen Iris Star (9492)
Claremont Whitby Maid 28th	A.I.S.	24450	22-2-37	8-7-40	273	18	7,419	3·84	284·58	Claremont Hospital for Insane	Wooroloo Persimmon (2972)
Glanavon Nancy	do.	25187	5-10-36	18-12-39	273	24	7,392	3·83	283·36	D. Bevan & Sons	Glanavon Ponsford (3202)
Claremont Star 18th	do.	24439	14-12-36	6-5-40	273	23	6,879	4·06	279·15	Claremont Hospital for Insane	Claremont Lyle Earl (9093)
Denmark Morning Glory	Guernsey	6967	21-6-37	19-9-40	273	8	5,004	5·58	278·96	Denmark Research Station	Denmark Damon (2519)
Grass Vale Design's Eve	Jersey	71636	1-7-37	27-7-40	273	11·5	4,663	5·54	258·36	R. H. Rose	Belgonia Design's Prince (14422)
Yanget Della 5th	A.I.S.	28694	11-6-37	19-9-40	273	18	6,864	3·72	255·10	A. E. Grant	Leylands Defiance (2380)
Brookfields Duchess	Guernsey	6835	3-6-37	2-9-40	273	8	4,659	5·24	244·45	W. Darnell	Brookfields Majesty (3254)
Koojan Ace's Wavelet 2nd	do.	7245	2-3-37	21-3-40	210	13	4,020	6·04	242·73	R. J. Giles	Homestead Ace (imp. U.S.A.) (1631)
Brookfields Loyalty	do.	6837	12-5-37	20-6-40	273	9	4,437	5·32	235·89	P. G. Hampshire	Koojan Ace's Majestic (2735)
Yanget Lady Thelma 2nd	A.I.S.	....	31-8-37	13-9-40	273	10	5,130	4·25	217·90	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Warrawong Weigala	Guernsey	8047	16-3-37	10-8-40	180	18	4,320	4·64	200·73	S. F. Russell	Nundorah Climax (1366)
Yanget Treasure 3rd	A.I.S.	....	5-8-37	22-9-40	240	14	4,980	4·03	200·55	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Rutherwood Rosella	Guernsey	7828	14-8-36	29-1-40	210	15	3,135	5·96	186·99	Misses E. & I. Rutherford	Denmark Rosa's Prosper (2639)
Wendowie Princess Patricia	do.	8084	31-8-37	25-9-40	150	16	3,420	4·80	164·10	S. F. Russell ...	Muresk Golden Chief (2925)
Westby Lupin 10th	A.I.S.	28525	1-8-37	28-10-40	150	13·5	4,275	3·79	161·85	Burkitt & Brown ...	Telyarup Duke (956)
Brackenhurst Gem	do	....	3-6-37	28-10-40	210	8	3,885	3·97	154·14	R. J. Morgan	Thornleigh Champagne (930)
Lansdowne Cream Sox	Guernsey	7263	19-9-37	25-10-40	150	15	2,970	5·12	153·57	J. R. Giles	Koojan Ace's Romancer (3436)
Yanget Red Queen 3rd	A.I.S.	....	30-7-37	5-8-40	150	22	4,215	3·56	150·06	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Warrawong Waratah	Guernsey	8037	13-9-37	29-11-40	90	31	3,060	4·67	143·04	S. F. Russell	Moongi Chum (1921)
Rutherwood Jonquil	do.	6263	18-5-36	6-11-39	273	7	2,421	5·36	129·83	Misses E. & I. Rutherford	Koojan Forty Winks (2738)
Brookfields Blonde	do.	6834	24-8-37	24-9-40	90	20	2,100	5·18	108·78	P. G. Hampshire	Koojan Ace's Majestic (2735)
Wendowie Dainty	do.	8080	5-9-37	7-10-40	120	16	2,430	4·33	105·24	S. F. Russell	Muresk Golden Chief (2925)
Glanavon Golden Girl 2nd	A.I.S.	25182	22-4-37	9-6-40	90	29	3,210	3·30	105·00	D. Bevan & Sons ..	Parkview Commodore (306)
Yanget Pendant 3rd	do.	....	9-7-37	30-7-40	150	13	2,835	3·05	86·48	A. E. Grant	Blacklands Lancer (1874)
Rosy Hill Pearl 9th	Jersey	....	9-1-37	22-4-40	120	7	1,500	5·44	81·63	M. T. Padbury	Glen Iris Star (9492)

HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk Last day of Test.	Weight of Milk for period.	Average Test.	Weight of Butter-Fat for period.	Owner.	Sire.
						lb.	lb.	%	lb.		
COWS 3 YEARS AND UNDER 3½ YEARS—*continued.*											
Wendowie Jaunty	Guernsey	8083	29-9-37	27-12-40	60	24	1,620	4·50	72·90	S. F. Russell	Muresk Golden Chief (2925)
Wamco Floss	Jersey	....	4-8-37	6-9-40	60	17	1,245	5·10	63·51	W.A. Missionary College	Austral Park Wonderful Standard (12423)
COWS 3½ YEARS AND UNDER 4 YEARS—STANDARD 290 LB. BUTTER-FAT.											
Koojan Ace's Jean	Guernsey	5660	10-3-36	25-2-40	273	29	8,817	5·99	528·70	A. W. Padbury ...	Homestead Ace (imp. U.S.A.) (1631)
Glanavon Sunbeam 9th ...	A.I.S.	25193	16-3-36	29-10-39	273	29	9,507	4·23	402·56	D. Bevan & Sons ...	Glanavon Nimrod (437)
Lansdowne Dairy Miss 4th	Guernsey	5680	24-11-35	9-10-39	273	14·5	7,244	5·53	400·16	J. R. Giles	Koojan Ace's Aristocrat (2730)
Denmark Rosemary	do.	5451	7-6-36	10-5-40	273	17	6,336	6·31	400·06	Denmark Research Station	Koojan Golden Prosper (2283)
					365	13	7,565	6·68	505·85		
Glanavon Buttercup	A.I.S.	25158	4-5-36	6-3-40	273	20	8,220	4·82	395·93	D. Bevan & Sons ...	Blacklands Jean's Supreme (1871)
Wooroloo Trixie	do.	23276	4-11-36	4-6-40	273	22	8,451	4·22	356·90	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Wattle Creek Viola	do.	28503	15-2-36	26-10-39	273	23	9,819	3·62	355·91	E. T. Thatcher	Tipperary Violet's Monarch (2876)
Denmark Diana	Guernsey	6963	28 6-36	1-7-40	273	15	7,005	5·02	351·13	Denmark Research Station	Denmark Damon (2519)
Denmark Rosette	do.	6972	21-7-36	22-6-40	273	14	5,712	5·98	341·84	Denmark Research Station	Koojan Golden Prosper (2283)
Crantock Napoleon's Primula 3rd	Jersey	66068	21-6-36	30-3-40	273	18·5	6,011	5·47	328·57	Mrs. G. H. Burnside	Crantock Blonde's Napoleon (8207)
The Wold Princess Daisy	do.	64561	7-8-36	12-6-40	273	4·5	5,444	5·84	317·92	L. C. Field	Grantham Air Prince 2nd (10657)
Tipperary Beauty 4th	A.I.S.	22897	20-6-36	17-6-40	273	19	6,927	4·45	308·14	W. G. Burgess	Blacklands Monarch's Commander (1877)
Koojan Ace's Dulcie .. .	Guernsey	5658	6-3-36	9-3-40	273	22·5	6,053	5·08	307·83	Denmark Research Station	Homestead Ace (imp. U.S.A.) (1631)
Yanget Gwen 2nd	A.I.S.	28696	12-11-36	10-6-40	273	16	8,553	3·57	305·43	A. E. Grant	Leylands Defiance (2380)
Denmark Prosperette	Guernsey	5446	17-5-36	2-5-40	273	15	5,925	5·11	302·83	Denmark Research Station	Denmark Damon (2519)
Rosy Hill Pearl 8th	Jersey	69013	30-6-36	28-4-40	273	15	5,745	5·25	301·34	M. T. Padbury	Glen Iris Star (9492)
Denmark Wild Rose	Guernsey	6974	1-7-36	26-6-40	273	13	6,204	4·83	299·51	Denmark Research Station	Koojan Golden Prosper (2283)
Koojan Diana	do.	7247	5-10-36	20-5-40	273	15	5,805	5·14	298·44	R. J. Giles	Koojan Ace's Aristocrat (2730)
Wooroloo Beryl	A.I.S.	23231	12-2-37	27-8-40	240	13	7,020	4·01	296·07	Wooroloo Sanatorium Farm	Wooroloo Duke 6th (3622)
Crantock Golden Cream 2nd	Jersey	70897	1-5-36	5 4-40	273	16	5,778	5·09	294·17	Mrs. G. H. Burnside	Crantock Blonde's Napoleon (8207)
The Wold Starbright's Princess	do	64562	4-6-36	29-3-40	273	6	4,743	5·98	283·50	L. C. Field	Grantham Air Prince 2nd (10657)
Mokine Amy 4th	do.	68039	24-8-36	31-7-40	273	12·5	5,671	4·92	279·22	H. A. Smith	Mokine Repulse (5867)
Yanget Miss Tottie 2nd	A.I.S.	23307	10-9-36	1-5-40	273	16	6,363	4·32	274·77	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Wooroloo Pearl 5th	do.	23264	1-10-36	20-6-40	210	16	6,015	4·49	269·91	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Grass Vale Lady Fowler 24th	Jersey	66786	4-12-36	20-7-40	273	9	5,757	4·57	263·30	R. H. Rose	Selsey Gay Boy (15134)
Yanget Della 3rd	A.I.S.	23296	1-4-36	21-1-40	273	15·5	6,752	3·84	259·58	A. E. Grant	Leylands Defiance (2380)

Wattle Creek Star	do.	28499	3–3–37	12–10–40	240	10	6,300	4·04	254·58	E. T. Thatcher	Yanget Autumn Sun (3630)
Yanget Snowdrop	do.	23313	31–5–36	15–12–39	273	18	5,904	4·25	251·08	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Claremont Herdsman's Pansy	do.	24415	18–12–36	16–9–40	273	12	6,366	3·66	233·03	Narrogin School of Agriculture	Claremont Herdsman (968)
Congelin Velveteen	Jersey	66011	4–12–36	24–7–40	150	20	4,080	5·36	218·76	B. P. Hack	Rosecliff Sybil's Mariposa (9997)
Warrawong Waybury	Guernsey	8043	15–12–36	17–10–40	150	13	3,660	5·80	212·40	R. J. Giles	Nundorah Climax (1366)
Westby Polly 4th	A.I.S.	23145	30–3–36	8–2–40	273	15	5,138	4·05	208·16	Narrogin School of Agriculture	Telyarup Duke (956)
Westby Carnation 3rd	do.	23137	25–8–36	22–3–40	273	20	5,520	3·66	201·89	R. J. Morgan	Telyarup Duke (956)
Yanget Flash 2nd	do.	23300	14–8–36	5–5–40	240	11	5,145	3·80	195·68	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Brackenhurst Ruby	do.	....	14–4–36	27–1–40	240	11	4,350	4·11	178·65	R. J. Morgan	Thornleigh Champagne (930)
Westby Lupin 7th	do.	23140	1–10–36	4–5–40	273	8	4,254	3·98	169·49	R. J. Morgan	Telyarup Duke (956)
Grass Vale Minora	Jersey	66787	11–9–36	22–5–40	150	14	2,715	5·51	152·97	R. H. Rose	Selsey Gay Boy (15134)
Glanavon Gem 2nd	A.I.S.	25179	19–10–36	19–8–40	90	32	3,690	3·43	126·54	D. Bevan & Sons	Blacklands Jean's Supreme (1871)

COWS 4 YEARS AND UNDER 4½ YEARS—STANDARD 310 LBS. BUTTER-FAT.

Travalgan Starbright 3rd	Jersey	59778	1–5–36	30–5–40	273	18	7,224	5·71	412·30	Robinson Bros.	Travalgan Northern Noble (10124)
Grantham Air Lady 3rd	do.	61950	28–4–36	17–6–40	273	13	6,234	6·43	401·09	W.A. Missionary College	Greenmount Black Prince (6511)
Glanavon Dahlia 4th	A.I.S.	25162	4–3–36	12–4–40	273	22	9,876	3·82	376·78	D. Bevan & Sons	Parkview Commodore (306)
Denmark Orange Pekoe	Guernsey	5444	11–6–36	19–9–40	273	18	7,044	5·33	375·26	Denmark Research Station	Denmark Damon (2519)
Brookfields Golden Queen 3rd	do.	5324	16–3–36	28–6–40	273	16	7,788	4·77	371·74	P. G. Hampshire	Koojan Ace's Majestic (2735)
Glanavon Doris 3rd	A.I.S.	25618	14–11–35	9–12–39	273	28	8,814	4·03	355·28	D. Bevan & Sons	Parkview Commodore (306)
Wendowie Quaker	Guernsey	6476	11–9–35	6–2–40	273	24	6,432	5·41	348·26	S. F. Russell	Muresk Golden Chief (2925)
Brookfields Charity	do.	5320	27–1–36	19–5–40	273	13	5,799	6·16	345·09	P. G. Hampshire	Koojan Ace's Majestic (2735)
Denmark Velda	do.	6973	13–7–36	26–7–40	273	11	6,903	4·92	340·12	Denmark Research Station	Denmark Damon (2519)
Crantock Napoleon's Daisy	Jersey	61210	26–7–35	26–1–40	273	16	6,205	5·09	316·19	Mrs. G. H. Burnside	Crantock Blonde's Napoleon (8207)
					365	16	8,003	5·23	418·10		
Rosy Hill Mars	do.	64109	27–8–35	29–10–39	273	8	5,124	5·95	304·86	M. T. Padbury	Rosy Hill Pearl's Chief (12136)
Denmark Golden Day	Guernsey	5440	29–7–35	17–11–39	273	14	5,502	5·07	278·77	Denmark Research Station	Denmark Damon (2519)
Wooroloo Flash 3rd	A.I.S.	23243	1–6–36	19–9–40	150	32	6,330	3·91	247·53	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Yanget Rudyard's Fussy	do.	23312	20–9–35	2–10–39	273	7	6,621	3·65	241·84	A. E. Grant	Blacklands Lancer (1874)
The Wold Northwood Crescendo	Jersey	64559	16–4–36	12–8–40	180	9·5	3,705	5·83	215·94	L. C. Field	Grantham Air Prince 2nd (10657)
Glanavon Daphne 2nd	A.I.S.	25164	15–12–35	6–3–40	150	33	5,550	3·68	204·48	D. Bevan & Sons	Parkview Commodore (306)
Yanget Treasure 2nd	do.	23314	29–4–36	6–9–40	210	15	5,220	3·83	200·07	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Yanget Champagne's Lovely	do.	23294	2–5–36	15–9–40	210	8	4,470	4·04	180·60	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Claremont Star 17th	do.	24438	5–1–36	24–4–40	90	26	2,790	3·73	103·98	Narrogin School of Agriculture	Claremont Herdsman (968)
Greenmount Flash Maid	Jersey	61972	28–1–36	27–4–40	60	29	1,785	5·10	91·08	A. J. B. Strempel	Greenmount Golden Flash (12736)
Congelin Rose Marie 2nd	do.	61155	2–5–36	10–9–40	30	33	990	5·56	55·08	B. P Hack	Clarendon Eyre Oxford Gamboge (10274)

COWS 4½ YEARS AND UNDER 5 YEARS—STANDARD 330 LBS. BUTTER-FAT.

Tipperary Maggie 4th	A.I.S.	18330	15–9–35	27–8–40	273	27	10,311	4·37	451·18	W. G. Burges	Blacklands Monarch's Commander (1877)
Glanavon Eva	do.	25175	20–11–35	4–6–40	273	30	10,230	4·25	434·50	D. Bevan & Sons	Villiers of Darbalara (2386)
Wooroloo Joy 2nd	do.	23251	3–8–35	15–3–40	273	29	9,905	4·17	413·19	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Wooroloo Empress	do.	23241	1–11–35	12–5–40	273	24	9,672	4·14	400·05	Wooroloo Sanatorium Farm	Parkview Guardian (2557)

HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk Last day of Test.	Weight of Milk for period.	Average Test.	Weight of Butter-Fat for period.	Owner.	Sire.
						lb.	lb.	%	lb.		
COWS 4½ YEARS AND UNDER 5 YEARS—*continued.*											
Namder Pride	Jersey	63313	25-10-35	22-9-40	273	17	6,711	5·76	386·76	H. S. Redman	Grass Vale Choice Star (12732)
Devonia Silver Queen	do.	66223	18-11-35	1-11-40	210	27	6,810	5·63	383·34	W. Padbury	Sabina Vale Silver Chief (13223)
Juadine Sparkle 13th	do.	67233	15-5-35	16-5-40	273	15	6,465	5·86	378·80	H. A. Smith	Juadine Robin (11751)
Wooroloo Moss Rose 4th	A.I.S.	23259	22-4-35	15-12-39	273	22	7,896	4·61	364·43	Wooroloo Sanatorium Farm	Triumph of Pine Creek (2515)
Wooroloo Freda 2nd	do.	23245	9-10-35	4-5-40	273	23	8,589	4·11	353·02	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Brackenhurst Eva's Ada 2nd	do.	19311	2-1-35	29-9-39	273	17	8,481	4·14	350·97	R. J. Morgan	Tipperary Royal's Re-Echo (964)
Tipperary Beauty 3rd	do.	18315	8-4-35	29-11-39	273	22	7,776	4·49	349·11	W. G. Burges	Blacklands Monarch's Commander (1877)
Denmark Rose Ophelia	Guernsey	5448	11-7-35	25 6-40	273	15	6,375	4·86	310·16	Denmark Research Station	Koojan Golden Prosper (2283)
Moorlands Jocylen	Jersey	....	3-8-35	5-5-40	240	15·5	6,000	5·17	309·99	Estate late P. Rose	Melrose Liberty (7973)
Grantham Easter Rye 4th	do.	57554	18-10-35	19-6-40	273	12	4,476	6·76	302·72	W.A. Missionary College	Greenmount Black Prince (6511)
Tipperary Dove 4th	A.I.S.	18323	18-7-35	21-7-40	240	20	6,390	4·27	273·00	W. G. Burges	Blacklands Monarch's Commander (1877)
Westby Carnation 2nd	do.	18515	12-8-35	29-7-40	240	7	7,560	3·53	267·03	Burkitt & Brown	Telyarup Duke (956)
Congelin Tangerine	Jersey	61156	13-6-35	16-6-40	180	17	5,115	5·16	263·96	B. P. Hack	Clarendon Eyre Oxford Gamboge (10274)
Westby Pearl 2nd	A.I.S.	18518	28-2-35	16-10-39	240	14	6,150	4·01	246·66	R. J. Morgan	Telyarup Duke (956)
Grantham Princess Starbright 3rd	Jersey	57557	20-9-35	2-6-40	273	9	3,762	6·44	242·17	W.A. Missionary College	Clarendon Eyre Oxford Pioneer (11484)
Westby Pearl 3rd	A.I.S.	23143	9-1-36	17 8-40	210	13	6,375	3·65	232·98	Bayley Bros.	Telyarup Duke (956)
Yanget Royal Lady 2nd	do.	15417	13-11-34	30-10-39	240	11	6,120	3·77	230·85	A. E. Grant	Tipperary Topsy's Monarch (2875)
Yanget Lady Thelma	do.	23302	17-3-35	4-3-40	273	14	6,402	3·58	228·98	A. E. Grant	Tipperary Topsy's Monarch (2875)
Mokine Heroine 11th	Jersey	63149	31-8-35	21-6-40	180	13	3,135	6·29	197·34	W.A. Missionary College	Mokine Repulse (5867)
Moorlands Janie	do.	....	16-11-35	14-7-40	180	8·5	3,841	4·94	189·46	Estate late P. Rose	Melrose Liberty (7973)
Crantock Golden Duchess	do.	70898	8-8-35	18-7-40	150	22·5	3,855	4·90	189·03	Mrs. G. H. Burnside	Crantock Blonde's Napoleon (8207)
Yanget Gwen	A.I.S.	23301	12-10-35	17-9-40	180	17	4,530	3·15	142·53	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Brackenhurst Ruby	do.	....	14-4-36	16-1-41	150	14	3,285	4·01	131·67	R. J. Morgan	Thornleigh Champagne (930)
COWS 5 YEARS AND OVER—STANDARD 350 LBS. BUTTER-FAT.											
Koojan Ace's Jewel 2nd	Guernsey	5661	4-3-35	23-9-40	273	51·5	14,540	5·51	801·16	A. W. Padbury	Homestead Ace (imp. U.S.A.) (1631)
Glanavon Fairy	A.I.S.	20204	22-12-34	18-8-40	273	51	17,583	3·92	688·60	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Koojan Ace's Jewel	Guernsey	4333	19-2-33	29-6-40	273	35	12,885	5·14	662·15	A. W. Padbury	Homestead Ace (imp. U.S.A.) (1631)
Travalgan Lady Mint 4th	Jersey	55607	11-4-34	9-5-40	273	21	10,353	6·23	645·25	Robinson Bros.	Banyule Altitude (5793)
Leylands Melba	A.I.S.	17170	1-9-33	17-10-39	273	42	14,451	4·37	631·66	D. Bevan & Sons	Widgee Waa Record (848)
Koojan Golden Butterfly	Guernsey	4339	18-4-33	27-6-40	273	33	11,229	5·48	615·43	A. W. Padbury	Koojan Ace (2270)

Koojan Ace's Pixie	do.	4336	11-4-33	26-9-40	273	38	11,664	5·18	603·82	A. W. Padbury .	Homestead Ace (imp. U.S.A.) (1631)
Koojan Ace's Mignonette	do.	3898	23-4-32	8-3-40	273	32	9,951	5·90	587·12	A. W. Padbury .	Homestead Ace (imp. U.S.A.) (1631)
Tabbagong Dove 11th	A.I.S.	14421	22-7-33	28-3-40	273	31	13,323	4·14	552·05	W. G. Burgess ...	Parkview Reward 2nd (260)
Wooroloo Milkmaid 5th	do.	15339	2-1-34	25-4-40	273	27	12,531	4·11	514·87	E. T. Thatcher	Parkview Guardian (2557)
Tipperary Beauty 2nd	do.	18314	8-4-34	30-7-40	273	28	11,964	4·20	503·67	W. G. Burgess	Blacklands Monarch's Commander (1877)
Leylands Topsy	do.	17182	18-4-33	2-10-39	273	45	12,975	3·80	503·24	D. Bevan & Sons ...	Parkview Commodore (306)
Brookfields Lady Faith	Guernsey	4062	19-6-32	25-10-39	273	29	9,927	5·06	501·96	P. G. Hampshire ..	Koojan Lord Barclay (1031)
					365	30	12,630	5·16	652·47		
Denmark Dawn 2nd	do.	5439	21-3-35	26-6-40	273	21	7,683	6·42	493·10	Denmark Research Station	Koojan Golden Prosper (2283)
					365	14	9,130	6·57	600·58		
Coogely Zonia	do.	5430	4-7-34	16-5-40	273	18·5	8,246	5·76	485·45	R. J. Giles	Koojan Forty Winks (2738)
Muresk Damsel	do.	4720	2-11-33	21-4-40	273	27	9,636	4·99	480·66	Muresk Agricultural College	Muresk Homestead (2075)
Wooroloo Duchess 2nd	A.I.S.	15324	15-8-32	19-6-40	273	26	12,258	3·84	471·34	E. T. Thatcher ...	Triumph of Pine Creek (2515)
Denmark Golden Dawn	Guernsey	4118	9-1-33	7-4-40	273	27·5	7,253	6·18	448·57	Denmark Research Station	Koojan Golden Prosper (2283)
Newry Lady Freda	do.	2719	13-9-28	16-11-39	273	17	8,661	5·16	447·02	P. G. Hampshire ...	Koojan Mack (596)
Glanavon Pink Pearl 2nd	A.I.S.	20208	3-9-34	16-11-39	273	26	10,278	4·33	445·41	D. Bevan & Sons ...	Blacklands Jean's Supreme (1871)
Illawah Lex 3rd	do.	11797	15-2-33	8-8-40	273	18	12,264	3·63	444·01	D. Bevan & Sons	Illawah Veteran's Hope (822)
Travalgan Starbright 2nd	Jersey	55608	4-9-34	21-5-40	273	19	7,707	5·64	434·78	Robinson Bros.	Travalgan Northern Noble (10124)
Blacklands Fairy 12th	A.I.S.	9301	6-5-32	30-3-40	273	36	11,628	3·65	424·46	D. Bevan & Sons ...	Orama of Blacklands (1905) (I.M.S.)
Blacklands Florrie 14th	do.	9307	12-4-32	23-9-41	273	8	9,069	4·66	422·34	D. Bevan & Sons ...	Orama of Blacklands (1905) (I.M.S.)
Tipperary Dove 2nd	do.	18321	9-7-34	6-8-40	240	17	12,255	3·43	420·60	B. W. Prowse . .	Parkview Rosy's Monarch (1681)
Moorlands Italy	Jersey	68074	20-7-34	30-3-40	273	17·5	7,238	5·78	418·70	Estate late P. Rose	Melrose Liberty (7973)
Blacklands Rosette 2nd	A.I.S.	9389	4-5-32	20-2-40	273	25	10,515	3·95	415·91	D. Bevan & Sons ...	Blacklands Major (369)
Glanavon Gold	do.	10925	25-6-32	12-12-39	273	31	10,563	3·93	415·65	D. Bevan & Sons ...	Villiers of Darbalara (2386) (A.M.S.)
Muresk Lady Fair	Guernsey	4729	20-9-32	8-5-40	273	24	8,142	5·05	411·16	Muresk Agricultural College	Triumph of Wollongbar (513)
Wendowie Quota	do.	6477	8-8-34	30-4-40	273	20	7,350	5·53	406·73	S. F. Russell . .	Coogely Chief Justice (2157)
Norric Peggy	A.I.S.	26939	14-4-35	27-6-40	273	22	9,666	4·15	400·75	W. G. Burges	Warwick Rufus (3595)
Juadine Peerless Lily 3rd	Jersey	28183	29-9-28	23-12-39	273	21	7,286	5·40	393·44	Miss L. Hancock	Larry of Juadine (5865)
Claremont Cherry 9th ..	A.I.S.	15955	25-11-34	18-4-40	273	19	8,457	4·57	386·72	Narrogin School of Agriculture	Tipperary Virginia's Re-echo (970)
Glanavon Esmeralda 2nd . .	do.	20203	11-3-35	29-7-40	273	15	10,515	3·67	386·45	D. Bevan & Sons	Parkview Commodore (306)
Denmark Golden Marie	Guernsey	3873	26-4-32	2-7-40	273	12	7,266	5·29	384·98	Denmark Research Station	Koojan Golden Prosper (2283)
Glanavon Doris	A.I.S.	10923	1-8-32	4-11-39	273	28	10,164	3·76	382·49	D. Bevan & Sons ...	Villiers of Darbalara (2386)
Lansdowne Dorothy	Guernsey	4359	27-7-33	9-10-39	273	15	7,575	5·00	379·01	J. R. Giles	Koojan Ace's Advocate (2272)
Beauna Vista Jock's Tiny	A.I.S.	9075	25-9-32	26-3-40	273	31	11,103	3·39	376·34	D. Bevan & Sons	Beauna Vista Jock (212)
Denmark Rose Dame 4th	Guernsey	5447	13-3-35	29-4-40	273	21	7,263	5·18	376·27	Denmark Research Station	Koojan Golden Prosper (2283)
Wooroloo Fairy 2nd	A.I.S.	18631	3-12-34	28-4-40	273	19	9,102	4·11	373·85	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Rosy Hill Pearl 7th	Jersey	59329	11-10-33	12-4-40	273	20	7,020	5·29	371·16	M. T. Padbury	Spring Park Starbright's Sweet Duke (8221)
Rosy Hill Mara	do.	64109	27-8-35	20-11-40	240	22	7,320	5·06	370·05	M. T. Padbury	Rosy Hill Pearl's Chief (12136)
Denmark Prosper's Rosa	Guernsey	4127	27-12-32	26-4-40	273	24	7,557	4·88	369·02	Denmark Research Station	Koojan Golden Prosper (2283)
Moorlands Happy	Jersey	54219	30-4-33	12-4-40	240	14	6,180	5·81	358·89	Estate late P. Rose	Melrose Liberty (7973)

HERD TESTING—*continued.*

COWS 5 YEARS AND OVER—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk Last day of Test.	Weight of Milk for period.	Average Test.	Weight of Butter-Fat for period.	Owner.	Sire.
						lb.	lb.	%	lb.		
Lansdowne Morden Lady	Guernsey	3479	10–11–31	19–9–40	273	14	7,317	4·89	357·53	P. G. Hampshire ..	Koojan Golden Broadcaster (1632)
Denmark Prosper's Lady	do.	3273	6–12 31	19–7–40	273	16	6,408	5·53	353·50	Denmark Research Station	Koojan Golden Prosper (2283)
Glanavon Rosalie	A.I.S.	20210	12–2–35	26–9–40	273	22	9,546	3·68	352·10	D. Bevan & Sons	Parkview Commodore (306)
Wendowie Empress	Guernsey	8082	17–2–35	17–3–40	273	15	6,855	5·12	350·86	S. F. Russell .. .	Koojan Lord Barclay (1031)
Blacklands Thelma 7th	A.I.S.	9393	3–12–32	23–12–39	273	31	9,903	3·54	350·20	D. Bevan & Sons	Parkview Limelight (370)
Wooroloo Lady Betty	do.	18634	3–8–34	25–12–39	273	23	8,019	4·28	343·02	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Brackenhurst Treasure 2nd	do.	15756	16–7–33	8–8–40	273	15	8,295	4·11	340·56	R. J. Morgan ..	Tipperary Royal's Re-Echo (964)
Brookfields Glory	Guernsey	4059	15–3–34	6–2–40	273	23	6,789	4·90	328·87	P. G. Hampshire	Koojan Ace's Chancellor (2274)
Tabbagong Dove 8th	A.I.S.	7511	19–12–31	27–3–40	273	17	7,761	4·23	327·87	W. G. Burges	Parkview Reward 2nd (260)
Brookfields Lady Lysle	Guernsey	5326	27–7–35	6–10–40	273	12	6,561	4·88	320·15	P. G. Hampshire	Koojan Ace's Majestic (2735)
Brookfields Mignonette	do	5329	18–6–35	20–7–40	273	18·5	6,971	4·57	318·99	W. Darnell	Koojan Lord Barclay (1031)
Brookfields Bonnie Blossom	do.	5319	15–8–34	13–4–40	273	13	6,084	5·22	317·70	W. Darnell	Koojan Lord Barclay (1031)
Juadine Peerless Lily 5th	Jersey	44519	27–9–32	25–4–40	273	19·5	6,539	4·79	313·73	Miss L. G. Hancock ...	Juadine Radiance (7598)
Newstead Daisy 12th	A.I.S.	12955	28–5–30	27–11–39	273	25	7,290	4·29	312·87	W. G. Burges	Superb of Newstead (2911)
Crantock Napoleon's Primula 2nd	Jersey	61211	7–7–35	17–1–40	273	10	5,055	6·17	312·34	Mrs. G. H. Burnside	Crantock Blonde's Napoleon (8207)
Glanavon Vida 2nd	A.I.S.	16495	25–5–33	18–11–39	240	18	7,530	4·13	310·89	E. T. Thatcher	Glanavon Nimrod (437)
Brookfields Golden Queen	Guernsey	4060	5–1–34	6–4–40	273	17	5,946	5·22	310·32	P. G. Hampshire ..	Koojan Lord Barclay (1031)
Garden Hill Silvermine 7th	Jersey	48173	29–9–33	15–11–40	210	25	6,480	4·78	309·97	M. T. Padbury ...	Glen Iris Star (9492)
Blacklands Miss Tottie 4th	A.I.S.	9365	12–4–32	26–10–39	273	20	7,245	4·21	305·16	A. E. Grant	Orama of Blacklands (1905) (I.M.S.)
Blacklands Daphne 7th	do.	9291	18–10–32	7–5–40	210	21·5	7,170	4·24	304·32	A. E. Grant	Fussy's Monarch of Hillview (493)
Juadine Juliet 8th	Jersey	44158	10–10–32	7–3–40	240	14·5	5,715	5·32	303·83	Miss L. G. Hancock	Juadine Radiance (7598)
Greenmount Starbright Marinora	do.	34841	31–5–30	6–11–39	210	22·5	5,310	5·72	303·69	A. J. B. Strempel ...	Werribee Starbright's King (2602)
Rosy Hill Venus	do.	64111	27–8–35	12–10–40	240	13	5,520	5·39	297·33	M. T. Padbury	Rosy Hill Pearl's Chief (12136)
Blacklands Sadie 5th	A.I.S.	9391	26–9–32	12–4–40	240	14	7,890	3·77	297·24	D. Bevan & Sons	Blacklands Major (369)
Yanget Della 2nd	do.	15409	3–5–34	29–9–39	273	15	7,500	3·96	297·20	A. E. Grant	Sunrise of Parkview (1875)
Muresk Rose	Guernsey	2156	9–5–28	15–10–39	273	11	6,003	4·88	293·00	S. F. Russell	Triumph of Wollongbar (513)
Moorlands Iliad	Jersey	....	12–6–34	1–4–40	240	16	5,145	5·63	289·86	Estate late P. Rose	Melrose Liberty (7973)
Westby Polly	A.I.S.	15141	21–5–32	17–2–40	273	22	7,791	3·70	288·05	Narrogin School of Agriculture	Telyarup Duke (956)
Juadine Peerless Lily 6th	Jersey	57869	27–8–34	17–7–40	210	18	6,330	4·53	286·77	D. Bradford	Juadine Sunshine (8212)
Grass Vale Noramine	do.	48537	17–11–33	13–5–40	273	5·5	5,327	5·35	285·12	R. H. Rose	Banyule Silvermine's Twylish (7600)
Claremont Duchess 2nd	A.I.S.	9920	17–10–33	9–8–40	273	9	7,062	4·04	285·11	Narrogin School of Agriculture	Tipperary Virginia's Re-Echo (970)
Congelin Rose Marie	Jersey	61154	5–4–35	24–5–40	210	18	5,370	5·31	284·99	B. P. Hack	Rochette's Golden (imp.) (7962)
Moorlands Hester	do.	....	5–8–33	25–3–40	240	9	5,190	5·36	278·22	Estate late P. Rose	Melrose Liberty (7973)
Westby Lupin 2nd	A.I.S.	15139	6–9–33	12–2–40	273	16	6,873	3·99	273·92	Narrogin School of Agriculture	Telyarup Duke (956)

Denmark Rose Dame	Guernsey	1794	19-8-27	12-11-39	273	18	6,414	4·09	262·50	Denmark Research Station	Rose Chief of Wollongbar (130)
Congelin Iolanthe	Jersey	61152	27-3-35	22-4-40	240	17	6,383	4·09	260·99	B. P. Hack	Rochette's Golden (imp.) (7962)
Moorlands Jolly	do.	....	28-3-35	12-6-40	210	16	5,460	4·76	259·74	Estate late P. Rose	Preston Prospector (11024)
Greenmount Bonetienne's Twinklette	do.	44202	6-8-33	2-12-39	210	16·5	4,665	5·52	257·49	A. J. B. Strempel	Bellefaire Bonaparte's Bonetienne (9224)
Garden Hill Golden Princess	do.	43921	14-12-32	12-10-39	273	11	4,248	6·05	257·15	W. Padbury	Glen Iris Star (9492)
Blacklands Lady Thelma 7th	A.I.S.	9342	1-11-32	3-10-39	273	12	6,801	3·68	250·36	A. E. Grant	Parkview Limelight (370)
Moorlands Janet	Jersey	....	25-3-35	4-6-40	210	12	5,205	4·77	248·40	Estate late P. Rose	Preston Prospector (11024)
Yanget Florrie	A.I.S.	18653	18-3-35	22-9-40	240	14	6,315	3·83	243·08	A. E. Grant	Sunrise of Parkview (1875) (I.M.S.)
Coogely Princess	Guernsey	4103	25-11-32	12-8-40	180	19	5,040	4·78	240·96	S. F. Russell	Karridale Laddie (1440)
Grass Vale Lady Fowler 17th	Jersey	48536	6-5-33	27-5 40	210	13·5	4,500	5·26	236·76	R. H. Rose	Banyule Silvermine's Twylish (7600)
Brookfields Primrose	Guernsey	5331	24-2-35	16-5-40	240	9·5	4,425	5·15	227·91	W. Darnell	Koojan Ace's Majestic (2735)
Yanget Pendant 2nd	A.I.S.	15415	29-6-33	14-1-40	273	18	5,319	4·28	227·84	A. E. Grant	Yanget Lucky Boy (978)
Westby Ulery	do.	15143	15-6-33	31-8-40	180	18·5	7,305	3·12	227·72	Burkitt & Brown	Telyarup Duke (956)
Claremont Flora	do.	15961	27-8-34	13-3-40	273	7	6,186	3·63	224·38	Narrogin School of Agriculture	Claremont Herdsman (968)
Brackenhurst Gibson's Gentle	do.	9490	14-9-32	22-1-40	273	16	6,348	3·45	219·01	R. J. Morgan	Tipperary Royal's Re-Echo (964)
Devonia Starbright's Fancy	Jersey	43631	20-9-32	1-1-41	120	28	3,570	6·10	217·71	W. Padbury	Grantham Starbright's King (5796)
Koojan Daffodil	Guernsey	2231	2-10-28	21-11-39	273	13	4,171	5·21	217·26	Misses E. & I. Rutherford	Koojan Golden Governor (595)
Denmark Atalie	do.	5436	23-6-34	5-1-40	240	17·5	4,095	5·19	212·45	Misses E. & I. Rutherford	Koojan Golden Prosper (2283)
Westby Carnation	A.I.S.	18514	30-5-35	9-9 40	180	17·5	6,120	3·44	210·24	Burkitt & Brown ..	Telyarup Duke (956)
Leylands Lady Betty	Guernsey	4384	26-9-32	29-6-40	210	12	3,915	5·21	204·08	S. F. Russell	Koojan Ace's Advocate (2272)
Westby Lupin 3rd	A.I.S.	18516	31-8-34	30-10-40	150	14·5	5,280	3·82	201·60	Burkitt & Brown	Telyarup Duke (956)
Blacklands Florrie 13th	do.	9306	3-12-31	22-12-39	210	19	5,070	3·81	193·35	A. E. Grant	Orama of Blacklands (1905) (I.M.S.)
Greenmount Marinette	Jersey	34840	24-5-31	3-3-40	120	29·5	3.525	4·79	169·05	A. J. B. Strempel	Grantham Starbright's King (5796)
Blacklands Pretty Maid 6th	A.I.S.	9376	25-2-32	10-9-40	120	24	5,265	3·15	165·71	A. E. Grant	Orama of Blacklands (1905) (I.M.S.)
Westby Pearl 2nd	do.	18518	28-2-35	17-10-40	210	11	4,538	3·54	160·73	R. J. Morgan	Telyarup Duke (956)
Lansdowne Dymphna	Guernsey	5683	15-7-35	30-11-40	120	19	3,180	4·84	153·84	J. R. Giles	Koojan Ace's Aristocrat (2730)
Yanget Rudyard's Fussy	A.I.S.	23312	20-9-35	6-10-40	210	15	4,620	3·14	145·17	A. E. Grant	Blacklands Lancer (1874)
Coogely Ace's Daffodil	Guernsey	5422	11-4-34	4-10-40	150	14·5	2,850	4·97	141·69	R. J. Giles	Homestead Ace (imp. U.S.A.) (1631)
Colmyn Eileen	Jersey	43463	8-10-32	25-8-40	120	13	3,180	3·73	118·48	B. P. Hack	Rye Duke of Glen Iris (1994)
Brackenhurst Eva's Ada 2nd	A.I.S.	19311	2-1-35	28-1 41	120	20	3,030	3·66	110·79	R. J. Morgan	Tipperary Royal's Re-echo (964)
Blacklands Graceful 7th	do.	9318	24-7-32	16-10 40	120	21	3,420	3·21	109·80	A. E. Grant	Orama of Blacklands (1905) (I.M.S.)
Brackenhurst Gibson's Gentle	do.	9490	14-9-32	17-2-41	120	20	3,000	3·19	95·70	R. J. Morgan	Tipperary Royal's Re-echo (964)
Blacklands Florrie 13th	do.	9306	2-12-31	19-12-40	120	24	2,790	3·28	91·26	A. E. Grant	Orama of Blacklands (1905) (I.M.S.)
Blacklands Miss Tottie 4th	do.	9365	12-4-32	9-1-41	150	7	1,890	3·57	67·53	A. E. Grant	Orama of Blacklands (1905) (I.M.S.)
Denmark Rose Pearl 7th	Guernsey	5449	17-10-34	12-12-40	60	25	1,560	4·17	65·10	S. F. Russell	Koojan Golden Prosper (2283)
Yanget Lady Thelma	A.I.S.	23302	17-3-35	20-11-40	120	9	1,485	3·80	56·43	A. E. Grant	Tipperary Topsy's Monarch (2875)

[illegible]

[illegible]

[illegible]

[

[illegible]

[illegible]

[illegible]

9. All birds to be accepted must conform to the following conditions:—

(a) Shall be the property of the breeder;

(b) Must be not less than six months and not more than nine months of age on 20th March, 1940;

(c) Must be fair specimens of the breed;

(d) Must weigh not less than:—

	lbs.
Section "A"—Light Breeds:	
Leghorn, Ancona	3¾
Minorca	4
Section "B"—Heavy Breeds:	
Australorp	5
Sussex, Langshan	5
Plymouth Rock	5
Section "C"—Medium Heavy Breeds:	
Barnevelder	5
Rhode Island Red	5
Wellsummer	4½
Wyandotte	4½

10. All birds sent to the trial must conform with the weight prescribed in the preceding paragraph, otherwise the committee shall cancel the allotment of pens, in addition to which the entrance fee may be forfeited.

11. All birds shall be treated for vermin and delivered at the Muresk Agricultural College, Muresk, between 18th March and 20th March, inclusive, in new coops or crates, with the breeder's name and address clearly stencilled or painted thereon. Entries will not be accepted from any person whose premises are tick-infested or whose flock is suffering from any infectious or contagious disease.

NOTE.—No birds will be accepted on Sunday, 17th March, 1940.

12. Freight to the College is to be prepaid or delivery will not be accepted. Freight on rejected birds must be paid by the breeder.

13. All birds must be ringed with the numbered leg bands supplied and forwarded free to the breeder. These will correspond with the number of the pens allotted. The pens having overhead netting, it is unnecessary to cut any bird's wing feathers.

14. The Poultry Adviser, or his representative, shall have the power to reject any bird which in his opinion is not of the correct age, or which he considers does not conform in any way to Rule 9, and his decision shall be final.

15. Any bird found to be suffering from an infectious or contagious disease or with crooked breasts, or side sprigs in combs, will be rejected and returned and shall be replaced by a suitable one within seven days after the notification of same. If any bird is found infested with tick the group will be rejected, the entry cancelled, and the entry fee forfeited.

16. In the event of a bird during the course of the Trial becoming diseased, incapacitated from laying, or developing vicious habits (such as egg-eating or feather-eating), it may be returned, or, on the written authority of the owner, destroyed. BREEDERS WILL NOT BE ALLOWED REPLACEMENTS UNDER THIS REGULATION.

17. No breeder shall withdraw any bird until the termination of the trial, except as provided in Rule 16.

18. The committee reserves to itself the right to inspect, or to have inspected, any applicant's stock, with a view to determining whether the quality and character of the birds warrant the allotment of pens.

19. (a) Any breeder taking part in the current trial will have the right of allotment of one pen of six birds per section in the succeeding trial. After such allotment new applicants will have the right of allotment of one pen of six birds per section. Should there then be any vacant pens they will be allotted by ballot to any applicant.

19. (b) If after the allotment of pens, it is ascertained that incorrect information has been furnished the allotment may be cancelled and the birds returned. In such case the entrance fee shall be forfeited and the applicant may be debarred from entry to any future trial.

20. Any breeder violating or failing to conform to these regulations shall be subject to such disqualification as the committee may decide.

21. Where there is a tie for any place, the award shall be given to the breeder whose bird or group (as the case may be) lays the greater total weight of first-grade eggs.

22. While every care will be taken, the committee will not be responsible for loss or injury to any birds in any way in connection with the trial.

23. The committee may disqualify any breeder and may refuse entry to subsequent trials, where such breeder publishes in any way statements of records not in accordance with the official records of the trials.

24. The committee's decision in all matters shall be final.

PRIZES.

NOTE:

Certificates will accompany all prizes.

No prize shall be awarded in any section unless there are at least three entries. No second prize will be awarded unless there are at least four entries.

The full schedule of prizes will be published at an early date.

CHAMPION CERTIFICATE.

A Champion Certificate will be awarded to the group pen from sections "A," "B," and "C" obtaining the highest total of first-grade eggs during the term of the trial.

GOVERNMENT STANDARD CERTIFICATE.

A Government Standard Certificate and a Registered Sealed Copper Ring will be awarded to all birds laying not less than 200 or over 1st Grade eggs during the term of the trial.

DISCUSSION.

Some explanation with reference to the classes may not be out of place. In the schedule it will be noticed that light, heavy, and medium-heavy classes are defined by weight. This is not a clear interpretation of the classes. It has been found that the activity of the different breeds varies, so much so that the feeding of the light birds must be on a different plane to the feed given to the heavy. It was found that the food giving the best results for light breeds was too fattening for the heavy breeds. This was because the heavy breeds were not as active as the light and therefore did not utilise the carbohydrates to the best advantage. Hence the heavy breeds are fed on a narrower ration than are the light breeds.

Again, the breed placed into what is described as medium-heavy, are not necessarily lighter in weight than are the heavy breeds, but those placed in the medium-heavy class are more active than those breeds placed in the heavy class, yet not as active as those of the light breeds quoted. Hence the rations suitable for the medium-heavy breeds should be wider than that given for the heavy breeds but narrower than that given to the light breeds. This has been satisfactory and the feeding at the laying trial is based on the article on "Feeding" published in the Journal of Agriculture, September, 1934, pages 435 onwards, and in the December, 1936, Journal, pages 465 onwards. This system of feeding allows the birds the necessary requirements of protein and carbohydrates consistent with their activities, and the noticeable factor at the completion of each trial of the second series has been that the birds have been returned to their homes in good condition, each bird having put on weight during the period, but no bird has carried superfluous fat.

The following are the results of the trial ending 19th February, 1941:—

DETAILED RESULTS.

SECTION "A" (LIGHT BREEDS)—TEAMS OF SIX BIRDS.
(White Leghorns)

Name of Competitor and Bird Nos.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	Totals. 1st.	Totals. 2nd.
Thorpe Poultry Farm— 1—6	194	5	146	10	170	10	181	2	182	....	134	95	1007	116
G. and E. Robinson (*Black Leghorns*)— 7—12	139	12	186	4	174	....	181	....	171	....	171	1	1022	17
T. Gent— 13—18	115	27	187	41	161	22	13	....	112	55	172	12	760	157
H. P. Chalmer— 19—24	109	....	235	2	58	125	185	43	161	5	182	....	930	172
Mrs. R. Lowe— 25—30	173	29	171	....	120	74	182	3	205	11	123	19	974	136
R. Lowe— 31—36	212	1	198	7	112	8	194	2	209	5	172	....	1097	23
Webb's Hatchery— 37—42	216	2	174	....	186	....	200	2	171	....	205	6	1152	10
43—48	32	21	176	1	251	2	159	11	182	8	143	39	943	82
R. Harrison— 49—54	182	27	212	....	188	16	134	....	189	3	162	2	1067	48
F. B. Vickers— 55—60	126	....	94	6	151	6	107	35	225	15	86	34	789	96
R. Knight— 61—66	93	102	43	161	171	23	86	150	47	159	151	72	591	667
67—72	172	7	29	155	249	8	150	119	247	2	107	74	954	365
W. G. Hall— 73—78	176	....	119	89	191	2	135	3	142	4	128	22	891	120
E. C. Martin— 79—84	170	39	73	168	167	42	....	....	180	2	123	69	713	320
Mrs. E. E. Price— 85—90	212	4	181	12	127	4	220	20	174	5	108	....	1022	45
E. E. Price— 91—96	191	7	198	17	243	32	128	33	224	12	16	2	1000	103
E. Singleton— 97—102	179	1	162	9	144	19	164	....	199	8	189	41	1037	78
E. Littlewood— 103—108	103	58	93	21	159	4	173	12	136	3	73	2	737	100
W. and E. Kerr— 109—114	102	....	126	....	133	....	221	....	10	....	163	....	755	..
H. C. Yelland— 115—120	30	99	174	63	122	82	79	120	118	101	146	2	669	467
Goverseth Poultry Farm— 121—126	57	141	4	42	112	12	218	1	104	22	236	4	731	222
Max Stocker— 127—132	128	1	216	....	143	29	108	3	162	3	162	....	919	36
Kashmir Poultry Farm— 133—138	55	131	62	3	174	....	191	7	97	80	157	2	736	223
A. R. Caporn— 139—144	220	31	160	....	164	....	152	1	123	16	143	5	962	53
Mrs. M. H. Dadley— 145—150	168	....	12	....	191	....	186	....	139	2	148	....	844	2
F. Harris— 151—156	163	13	184	....	41	15	106	7	203	3	....	....	697	38

DETAILED RESULTS—*continued.*

SECTION "B" (HEAVY BIRDS)—TEAMS OF SIX BIRDS.
(Australorps)

Name of Competitor and Bird Nos.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	Totals. 1st.	Totals. 2nd.
M. H. Dadley—														
19—24	215	1	178	....	44	....	181	....	233	....	168	1	1019	2
Goverseth Poultry Farm—														
25—30	197	1	247	16	243	1	57	198	197	2	195	....	1136	218
A. R. Caporn—														
31—36	86	....	87	....	236	3	37	....	229	1	242	32	917	36
H. C. Yelland—														
37—42	193	38	204	1	135	43	176	2	215	34	169	13	1092	131
R. Harrison—														
43—48	56	19	254	....	238	....	168	1	244	....	63	....	1023	20
Runnymede Poultry Farm—														
49—54	72	121	93	1	227	4	246	3	14	2	205	....	857	131
W. and E. Kerr—														
55—60	166	47	142	1	193	23	176	....	242	1	175	1	1094	73
G. and E. Robinson—														
61—66	227	4	214	....	268	....	93	10	201	1	1	....	1004	15
67—72	170	28	114	19	32	26	202	....	202	3	164	10	884	86
R. Harrison—														
73—78	167	7	249	....	264	19	235	6	127	1	210	1	1252	34
Thorpe Poultry Farm—														
79—84	189	....	252	....	239	17	211	3	166	....	177	4	1234	24
A. L. Leeder—														
85—90	68	5	227	4	37	2	132	2	105	19	119	4	688	36
Mrs. E. E. Price—														
91—96	173	4	177	90	257	....	253	2	215	3	158	....	1233	99
E. E. Price—														
97—102	221	33	131	9	100	2	220	4	210	1	61	1	943	50
Matt Wall														
103—108	32	11	222	64	196	11	250	11	125	22	248	....	1073	119
F. Landquist & Son—														
109—114	144	....	89	1	51	3	168	19	202	11	174	46	828	80
N. T. Wilkinson—														
115—120	267	10	34	1	174	19	175	....	192	6	233	13	1075	49
W. G. Hall—														
121—126	213	1	243	12	228	....	205	1	273	28	212	9	1374	50
Wyndella Poultry Farm—														
127—132	222	....	225	18	166	3	194	5	218	2	222	1	1247	29
133—138	40	3	92	26	215	6	251	3	150	106	172	27	920	171
Webb's Hatchery—														
139—144	222	9	225	1	220	2	215	....	218	....	22	2	1122	14
Sudell & Son—														
145—150	165	3	205	5	171	1	150	1	142	13	142	2	975	25
Sundale Poultry Farm—														
151—156	52	4	210	....	195	3	222	2	142	86	210	1	1031	96
R. Knight—														
157—162	7	87	77	23	167	2	235	4	224	1	67	9	777	126
163—168	....	17	195	....	260	4	187	3	292	4	190	5	1124	33

SECTION "C" MEDIUM-HEAVY BREEDS)—TEAMS OF SIX BIRDS.
(Rhode Island Reds)

Name of Competitor and Bird Nos.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	Totals. 1st.	Totals. 2nd.
A. S. Webb (*White Wyandottes*) —														
157—162	145	2	29	171	149	4	107	62	168	23	64	202	662	464
G. and E. Robinson—														
163—168	145	7	76	21	182	....	3	41	114	88	110	36	630	193
M. Miller—														
1—6	152	4	126	1	207	2	134	48	212	....	207	....	1038	57
Beverley Poultry Farm—														
7—12	121	66	175	65	....	167	88	6	102	26	99	29	585	359
F. Landquist & Son—														
13—18	173	22	89	....	100	12	122	....	2	1	114	27	600	62

Mortality.

	No. of Birds.	Deaths.	Per cent.
White Leghorns	150	12	8·00
Australorps	150	16	10·66
Black Leghorns	6	...	...
Rhode Island Reds	24	1	4·16
White Wyandottes	6	1	16·66

MONTHLY AVERAGES.

Month.	No. of Birds and Breed.	Total No. of 1st Grade Eggs Laid.	Average.	Total No. of 2nd Grade Eggs Laid.	Average.	Average for all Grades.
March (11 days)	149 W.L. ...	250	1·67	158	1·06	2·73
	149 Aust. ...	616	4·13	107	·71	4·84
	6 B.L. ...	10	1·60	4	·60	1·12
	18 R.I.R. ...	57	3·16	7	·38	3·54
	6 W.W. ...	23	3·83	18	3·00	6·83
April	148 W.L. ...	1,442	9·87	267	1·70	10·94
	149 Aust. ...	2,723	18·27	88	·59	18·86
	6 B.L. ...	61	10·16	3	·50	10·66
	18 R.I.R. ...	212	11·77	11	·61	12·38
	6 W.W. ...	89	14·83	34	5·66	20·49
May	147 W.L. ...	1,654	11·17	230	1·55	12·72
	149 Aust. ...	2,717	18·23	179	1·20	19·43
	6 B.L. ...	68	11·30	...	...	11·30
	24 R.I.R. ...	215	8·95	20	·83	9·78
	6 W.W. ...	76	12·60	24	4·00	16·60
June	146 W.L. ...	1,283	8·78	182	1·24	10·02
	149 Aust. ...	2,345	15·73	260	1·74	17·47
	6 B.L. ...	52	8·60	1	·16	8·76
	24 R.I.R. ...	221	9·33	41	1·70	11·03
	6 W.W. ...	6	1·00	43	7·16	8·16
July	146 W.L. ...	1,722	11·79	322	2·20	13·99
	148 Aust. ...	2,566	17·33	123	·83	18·16
	6 B.L. ...	43	7·16	1	·16	7·32
	24 R.I.R. ...	290	12·08	47	1·95	14·03
	6 W.W. ...	29	4·83	15	2·50	7·33
August ...	146 W.L. ...	2,724	18·65	286	1·95	20·60
	146 Aust. ...	2,854	19·54	104	·71	20·25
	6 B.L. ...	117	19·50	...	...	19·50
	24 R.I.R. ...	370	15·41	74	3·08	18·49
	6 W.W. ...	62	10·33	34	5·66	15·99
September ...	144 W.L. ...	2,730	18·95	368	2·55	21·50
	145 Aust. ...	2,779	19·16	168	1·15	20·31
	6 B.L. ...	124	20·66	...	...	20·66
	24 R.I.R. ...	397	16·54	91	3·79	20·33
	6 W.W. ...	87	14·50	59	9·83	24·33
October ...	143 W.L. ...	2,756	19·27	476	3·33	22·60
	142 Aust. ...	2,604	18·34	185	1·30	19·64
	6 B.L. ...	123	20·50	...	...	20·50
	24 R.I.R. ...	350	14·58	113	4·70	19·28
	6 W.W. ...	88	14·66	62	10·33	25·00

MONTHLY AVERAGES—*continued.*

Month.	No. of Birds and Breed.	Total No. of 1st Grade Eggs Laid.	Average.	Total No. of 2nd Grade Eggs. Laid.	Average.	Average for all Grades.
November ...	142 W.L. ...	2,297	16·17	479	3·37	19·54
	137 Aust. ...	2,018	14·73	201	1·47	16·20
	6 B.L. ...	128	21·33	2	·33	21·66
	24 R.I.R. ...	227	9·45	67	2·80	12·25
	6 W.W. ...	72	12·00	52	8·66	20·66
December ...	141 W.L. ...	2,134	15·13	400	2·83	17·97
	136 Aust. ...	1,922	14·13	189	1·39	15·52
	6 B.L. ...	118	19·66	4	·66	20·33
	23 R.I.R. ...	200	8·70	83	3·60	12·30
	5 W.W. ...	50	10·00	54	10·80	20·80
January ...	139 W.L. ...	1,974	14·20	298	2·14	16·34
	135 Aust. ...	1,826	13·52	90	·66	14·18
	6 B.L. ...	101	16·83	1	·16	16·99
	23 R.I.R. ...	201	8·74	51	2·22	10·96
	5 W.W. ...	55	11·00	37	7·40	18·40
February (19 days)	138 W.L. ...	1,011	7·32	213	1·54	8·86
	134 Aust. ...	952	7·10	13	·09	7·20
	6 B.L. ...	57	9·50	1	·16	9·66
	23 R.I.R. ...	103	4·47	68	2·96	7·43
	5 W.W. ...	25	5·00	32	6·40	11·40

LIST OF COPPER BANDED BIRDS.

Copper Band No.	Trial No.	Breed.	Owner.	Eggs. First Grade.
83	20	White Leghorn	H. P. Chalmer	235
84	29	White Leghorn	Mrs. R. Lowe	205
85	31	White Leghorn	R. Lowe	212
86	35	White Leghorn	R. Lowe	209
87	37	White Leghorn	W. R. Webb	216
88	40	White Leghorn	W. R. Webb	200
89	42	White Leghorn	W. R. Webb	205
90	45	White Leghorn	W. R. Webb	251
91	50	White Leghorn	R. Harrison	212
92	59	White Leghorn	F. B. Vickers	225
93	69	White Leghorn	R. Knight	249
94	71	White Leghorn	R. Knight	247
95	85	White Leghorn	Mrs. E. E. Price ..	212
96	88	White Leghorn	Mrs. E. E. Price ..	220
97	93	White Leghorn	E. E. Price	243
98	95	White Leghorn	E. E. Price	224
99	112	White Leghorn	W. and E. Kerr	221
100	124	White Leghorn	H. J. Yelland	218
101	126	White Leghorn	H. J. Yelland	236
102	128	White Leghorn	Max Stocker	216
103	139	White Leghorn	A. R. Caporn	220
104	155	White Leghorn	F. Harris	203
209	19	Australorp	M. H. Dadley	215
210	23	Australorp	M. H. Dadley	233
211	26	Australorp	H. J. Yelland	247
212	27	Australorp	H. J. Yelland	243
213	35	Australorp	A. R. Caporn	229
214	36	Australorp	A. R. Caporn	242

LIST OF COPPER BANDED BIRDS—*continued.*

Copper Band No.	Trial No.	Breed.	Owner.	Eggs. First Grade.
215	38	Australorp	H. C. Yelland	204
216	41	Australorp	H. C. Yelland	215
217	44	Australorp	R. Harrison	254
218	45	Australorp	R. Harrison	238
219	47	Australorp	R. Harrison	244
220	51	Australorp	E. O. Harrison	227
221	52	Australorp	E. O. Harrison	246
222	54	Australorp	E. O. Harrison	205
223	59	Australorp	W. and E. Kerr	242
224	61	Australorp	G. and E. Robinson	227
225	62	Australorp	G. and E. Robinson	214
226	63	Australorp	G. and E. Robinson	268
227	65	Australorp	G. and E. Robinson	201
228	70	Australorp	G. and E. Robinson	202
229	71	Australorp	G. and E. Robinson	202
230	74	Australorp	R. Harrison	249
231	75	Australorp	R. Harrison	264
232	76	Australorp	R. Harrison	235
233	78	Australorp	R. Harrison	210
234	80	Australorp	H. Seal	252
235	81	Australorp	H. Seal	239
236	82	Australorp	H. Seal	211
237	86	Australorp	A. L. Leeder	227
238	93	Australorp	Mrs. E. E. Price	257
239	94	Australorp	Mrs. E. E. Price	253
240	95	Australorp	Mrs. E. E. Price	215
241	97	Australorp	E. E. Price	221
242	100	Australorp	E. E. Price	220
243	101	Australorp	E. E. Price	210
244	104	Australorp	Matt Wall	222
245	106	Australorp	Matt Wall	250
246	108	Australorp	Matt Wall	248
247	113	Australorp	F. Landquist & Son	202
248	115	Australorp	N. T. Wilkinson	267
249	120	Australorp	N. T. Wilkinson	233
250	Copper band not available—used as a sample.			
251	122	Australorp	W. G. Hall	243
252	123	Australorp	W. G. Hall	228
253	124	Australorp	W. G. Hall	205
254	125	Australorp	W. G. Hall	273
255	126	Australorp	W. G. Hall	212
256	127	Australorp	D. F. Robinson	222
257	128	Australorp	D. F. Robinson	225
258	131	Australorp	D. F. Robinson	218
259	132	Australorp	D. F. Robinson	222
260	135	Australorp	D. F. Robinson	215
261	136	Australorp	D. F. Robinson	251
262	139	Australorp	W. R. Webb	222
263	140	Australorp	W. R. Webb	225
264	141	Australorp	W. R. Webb	220
265	142	Australorp	W. R. Webb	215
266	143	Australorp	W. R. Webb	218
267	146	Australorp	Sudell & Son	205
268	152	Australorp	A. Wilkinson	210
269	154	Australorp	A. Wilkinson	222
270	156	Australorp	A. Wilkinson	210
271	160	Australorp	R. Knight	235
272	161	Australorp	R. Knight	224
273	165	Australorp	R. Knight	260
274	167	Australorp	R. Knight	292
275	3	Rhode Island Reds	M. Miller	207
276	5	Rhode Island Reds	M. Miller	212
277	6	Rhode Island Reds	M. Miller	207

PRIZE LIST.

	Owner.	Breed.	Score. 1st Grade.	Score. 2nd Grade.
Champion Certificate and "David Gray" Trophy	W. G. Hall ...	Australorp ...	1,374	50
Teams of 6 Birds—Section "A" (Light Breeds)—				
1st Prize—"Wesfarmers" and "Eggoleen" Cups and "S.M.P." Trophy	Webb's Hatchery	White Leghorns	1,152	10
2nd Prize—"Wright & Co." Trophy	R. Lowe ...	do. do.	1,097	23
3rd Prize	R. Harrison ...	do. do.	1,067	48
Teams of 6 Birds—Section "B" (Heavy Breeds)—				
1st Prize—"W.A. Auctioneers'" Cup and "Flint & Eldridge" Trophy	W. G. Hall ...	Australorps ...	1,374	50
2nd Prize—"Kirkby & Sons" Trophy	R. Harrison ...	do. ...	1,252	34
3rd Prize	Wyndella Poultry Farm	do. ...	1,247	29
Team of 6 Birds—Section "C" (Medium Heavy Breeds)—				
1st Prize—"Ian Hazlett" Cup and "National Egg" Trophy	M. Miller ...	Rhode Island Reds	1,038	37
2nd Prize—"York Flour Mills" Trophy	A. S. Webb ...	White Wyandottes	662	464
3rd Prize—"J. & W. Bateman" Trophy	G. & E. Robinson	Rhode Island Reds	630	193
Winter Test (from 21st March to 31st July, 1940)—				
Section "A" (Light Breeds): "R. B. Young" Trophy ...	R. Knight ...	White Leghorns	387	91
Section "B" (Heavy Breeds): "Excelsior" Trophy ...	W. G. Hall ...	Australorps ...	601	26
Section "C" (Medium Heavy Breeds): "T. Newby" Trophy ...	M. Miller ...	Rhode Island Reds	339	7
Summer Test (from 1st December 1940 to 19th February, 1941)—				
Section "B" (Heavy Breeds): "Western Ice Co." Cup and and "Nelson's" Trophy	R. Harrison ...	Australorps ...	244	...
SINGLES.				
Highest Score—Section "A" (Light Breeds)—				
1st Prize—"Macfarlane" Cup and "W. E. Fry" Trophy	Webb's Hatchery	White Leghorns	251	2
2nd Prize—"J. Banfield's" Trophy	R. Knight ...	do. do.	249	8
Highest Score—Section "B" (Heavy Breeds)—				
1st Prize—"Baird" Cup and "Krafco" Trophy	do. ...	Australorps ...	292	4
2nd Prize—"Barrow Linton" Trophy	W. G. Hall ...	do. ...	273	28
Highest Score—Section "C" (Medium Heavy Breeds)—				
"Enston" Cup and "Multiplo" Trophy	M. Miller ...	Rhode Island Reds	212	...

First to Lay 200 *Eggs*:

Section "A" Light Breeds—"Thomas & Co." Trophy—Owner: Webb's Hatchery, Bird No. 45 on 2nd December, 1940—257 days.

Section "B" Heavy Breeds—"Carbarn Mulberry & McLean Trophy—Owner: R. Knight, Bird No. 167 on 26th October, 1940—220 days.

Section "C" Medium Heavy Breeds—"Haynes & Clement" Trophy—Owner: M. Miller, Bird No. 3 on 26th January, 1941—312 days.

Special Trophy:

"Robinson" Trophy: Team laying lowest percentage of second grade eggs. Minimum total lay of 1,000 first grade eggs. Owner: M. H. Dadley—Australorp—1,019 first grade, 2 second grade.

"A. S. Webb" Trophy: Bird laying longest sequence first grade eggs. Owner: Thorpe Poultry Farm—Australorp—81, laid a sequence of 56.

Prizes for Type (Judged by B. Melsom, Teams of 6 Birds):

Section "A": "Vickers" Trophy—Owner: M. Stocker—White Leghorns (Nos. 127-132).

Section "B": "W. G. Hall" Trophy—Owner: R. Harrison—Australorps (Nos. 73-78).

Section "C": "Mrs. Dadley's" Trophy—Owner: F. Landquist & Son—Rhode Island Reds (Nos. 13-18).

Bird laying 300 first grade eggs and over—Owner: R. Knight—Australorp—308.

Consolation prizes allocated to teams that laid well in summer months:—

Section "A"—"Lever's" Trophy: Webb's Hatchery—White Leghorns.

Section "B'—"J. Goss" Trophy: Sundale Poultry Farm—Australorps.

Section "C"—"Scanlon & Simper's" Trophy: M. Miller—Rhode Island Reds.

YEARLY AVERAGES.

	1st Grade.	2nd Grade.	Average All Grades.
White Leghorn (W.L.)	152.97	25.46	178.43
Australorp (Aust.)	180.21	11.84	192.05
Black Leghorn (B.L.)	166.8	2.73	169.53
Rhode Island Red (R.I.R.)	123.18	28.62	151.80
White Wyandottes (W.W.) ..	114.58	81.4	195.98

AVERAGE FOR ALL BIRDS IN TEST.

All Birds	147.54	30.01	177.55

WINTER TESTS RESULTS.

(March 20th to July 31st—133 days.)

Winners.	No. of Eggs.	Average.
Light Breeds—R. Knight (2), W.L.	387	64.50
Heavy Breeds—W. G. Hall, Aust.	601	100.16
Medium-Heavy Breeds—M. Miller, R.I.R.	339	56.50

LAYING AVERAGE FOR WINTER TEST.

	1st Grade.	2nd Grade.	All Grades.
White Leghorns	43.28	7.75	51.03
Australorps	73.69	5.07	78.76
Black Leghorns	38.82	1.42	40.24
Rhode Island Reds	45.29	5.47	50.76
White Wyandottes	37.09	22.32	60.01

SUMMER TEST.

(1st December to 19th February—81 days.)

	1st Grade	2nd Grade.
Heavy Breeds—Australorps, R. Harrison	244	—
Light and Medium Heavy Breed—White Leghorn and Rhode Island Reds: No award as no team reached 1,200 eggs throughout total test period.		

LAYING AVERAGES FOR SUMMER TESTS—ALL TEAMS.

(1st December to 19th February—81 days.)

	1st Grade.	2nd Grade.	All Grades.
White Leghorn	36.65	6.51	42.16
Australorp	34.75	2.14	36.89
Black Leghorn	45.99	.98	46.97
Rhode Island Red	21.91	8.78	30.69
White Wyandottes	26.00	24.60	50.60

COMPARISON OF TEN LEADING PENS DURING THE LAST FIVE YEARS.

	1936–37.		1937–38.		1938–39.		1939–40.		1940–41.	
	Grades.		Grades.		Grades.		Grades.		Grades.	
	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.	1st.	2nd.
10 pens White Leghorns	960·8	21·7	1,074·6	80·6	1,106·6	54·4	988·9	99·4	1,027·2	97·7
10 pens Australorps	1,128·6	12·1	1,268·6	70·6	1,181·4	99·9	1,128·1	95·8	1,190·8	70·5
5 pens Rhode Island Reds	798·2	220·0	901·2	149·1	902·8	123·0	758·3	43·6	703·0	227·0

In the above trial 90 birds qualified for copper rings, or 23.81 per cent.

The champion team was a pen of Australorps entered by W. G. Hall of Melville.

The total of 1,374 first grade eggs was 118 eggs higher than the winner of 1939-40.

Webb's Hatchery, of Tuart Hill, won in the White Leghorn section with a total of 1,152 first grade eggs, 55 eggs higher than 1939-40.

In the Rhode Island Red section, M. Miller, of Beverley, won with a team which laid 1,038 first grade eggs, 48 eggs higher than 1939-40.

Bird No. 81, owned by Thorpe Poultry Farm, of Brookton, laid a sequence of 56 eggs.

Australorp No. 167, owned by R. Knight, Kenwick, laid 308 first grade eggs in 365 days.

FEEDING.

Feed Consumed.	1936–37.	1937–38.	1938–39.	1939–40.	1940–41.
	bush.	bush.	bush.	bush.	bush.
Wheat	190½	165½	224¾	231⅓	225½
Pollard	186	191	227½	226½	210
Bran	207	178	224	282	313½
	lbs.	lbs.	lbs.	lbs.	lbs.
Wheatmeal	6,798	6,469	8,438	9,493	11,433
Bonemeal	747	990	932	1,072	1,162
Meatmeal	1,700	1,962	2,870	3,312	3,459
	ozs.	ozs.	ozs.	ozs.	ozs.
Per Fowl per day ...	5·14	5·13	5·16	5·16	5·67

Cost of feeding for 48 weeks in the 1940-41 Trial was £155 16s. 5d., or equal to 9s. 3½d. per bird, while the net average return for eggs was 18s. 1d. The average profit was 8s. 9½d. per bird.

	1936–37.	1937–38.	1938–39.	1939–40.	1940–41.
Cost of feed	9s. 9¼d.	10s. 3d.	6s. 10d.	8s. 1d.	9s. 3½d.
Average gross profit ...	8s. 10d.	9s. 2¼d.	11s. 8d.	8s. 2¼d.	8s. 9½d.

Note.—Feeding costs are based on retail prices of all goods as charged by metropolitan produce merchants, whilst the returns for eggs are those received in open sales less 5 per cent. selling commission, and a deduction of an account sales fee of 6d. per sale day (a sum equal to £2 12s. per annum).

Composts.

Turning Waste Materials into Valuable Manure.

L. T. JONES.

It is a well known fact that continual cultivation of soil will eventually lead to its deterioration. This deterioration is reduced by resting the soils under pasture cover, or by applying organic manure.

Modern farming practice uses chemical fertilisers, which overcome certain soil deficiencies and greatly increase crop yields. But experience has proved that inorganic fertilisers must be used in conjunction with management designed to maintain the organic matter content of the soil. The importance of crop rotation cannot be over-emphasised, and where it is not practicable to lay cultivated land under grass, the application of organic manures becomes necessary. At Rothamsted, England, long continued growth of cereals on the same land has led to a decrease in yield, whether only artificial fertilisers or farmyard manure were used, but yields have been better maintained with the farmyard manure. On the other hand good yields have been obtained without farmyard manure by suitable additions of artificial fertilisers, by occasional fallows, and by periods under clover pasture. It was also found that, for root crops, potatoes, market garden crops, and in some circumstances apparently for clover and lucerne, farmyard manure has special beneficial effects not easily obtained otherwise.

THE BENEFITS OF ADEQUATE ORGANIC MATTER IN THE SOIL.

The benefits an adequate supply of organic matter can convey to a soil are:—

(a) It usually contains all the plant nutrients. In the past only three major elements have been considered necessary in fertilisers, viz., potash, phosphate, and nitrogen. Complete manures should have many other necessary elements, including those such as copper and manganese, required in very small amounts, all of which are in organic matter. Plant hormones, which are growth regulators and stimulants resembling vitamins, are also present in organic matter.

(b) The water holding capacity of a soil is increased by the addition of organic matter, which means that the plants growing on such a soil stand drought better.

(c) Organic matter enables sandy soils to absorb and retain soluble nutrients. This is due to the fact that, like clay, humus has the capacity to hold plant nutrients till they are drawn upon by the plant.

(d) The physical properties of the soil are improved by the addition of organic matter. Sandy soils are rendered more compact, and clayey soils more open and friable. In fact, one of the major advantages of organic matter is the improvement of the soil structure, so that it retains its mellowness, water absorbing properties, ability to resist erosion, etc.

METHODS OF MAINTAINING ORGANIC MATTER IN THE SOIL.

Organic matter in practice is returned to a cultivated soil in four ways:—

1. Green manuring.
2. Long and short term pastures.
3. Animal manure.
4. Plant and animal wastes, as in the form of composts.

It is the object of this article to focus attention on composts.

Composts are made from waste plant materials, such as lawn clippings, straw, prunings, etc., with or without the addition of animal manure and urine. They are of value for farmers generally, but especially for market gardeners and home gardeners at a time of scarcity of the artificial fertilisers commonly used.

In recent years a great deal of attention has been paid to the subject of making compost, or artificial farm manure, but it is evident that composting cannot satisfactorily be reduced to rule-of-thumb methods. Each individual composter must adapt his technique to the raw material at his disposal, and his special circumstances. There is plenty of scope for ingenuity and flexibility of programme. For our local conditions the cost of production must be kept at a minimum or the manure produced will not give profitable results. On account of cost, the practice cannot be recommended for extensive farming operations such as wheat growing.

PRACTICES IN MAKING COMPOSTS.

Composts have been used in agriculture since early times. The first scientific approach to the subject was by Richards and Hutchinson at Rothamsted, England, who developed the "Adco" process, partly to meet the shortage of fertilisers during the 1914-1918 War. Here organic matter, in the form of straw and other farm residues, is built into heaps, layer by layer, and each layer is moistened and certain chemicals added. This treatment promotes decomposition

and gives a final product very closely resembling farmyard manure in most properties. It is just as effective as farmyard manure. This method tends to be expensive.

At Indore, India, Howard and his associates introduced a new method of composting designed to suit their conditions. Plant material is layered with dung, bedding and urine plus a small quantity of calcareous urine-soaked soil. Wood ashes are sometimes added. The heap is kept moistened and from time to time is turned to allow air to enter until a loose fibreless product is formed. This is a very convenient form for application.

Albrecht of Missouri makes a useful compost from wheat straw, relying on the natural rainfall to keep the heap moist. To every ton of dry straw, 75 lbs. of sulphate of ammonia, 25 lbs. of superphosphate, and 70 lbs. of ground limestone are added to promote rotting and improve the manurial value.

ESSENTIAL POINTS IN MAKING COMPOSTS.

Composting is essentially a process whereby the rotting of plant and animal materials is promoted, in a heap or pit, by proper treatment to make a satisfactory manure. The essential conditions are:—

1. An adequate moisture supply.
2. Sufficient air supply for rotting but proper compaction to avoid drying out.
3. Warm temperatures.
4. Supplementary mineral fertilisers containing nitrogen, phosphate and potash if the materials composted are short of these.
5. A neutral or slightly alkaline reaction which may be brought about by ground limestone, wood ashes or calcareous soil.

WHAT HAPPENS IN A COMPOST HEAP.

When the compost heap keeps moist and warm and there is plenty of available nitrogen the micro-organisms are active and rotting is rapid. Starches and celluloses of the softer tissues are decomposed and either built into the bodies of the fungi and bacteria or, if the nitrogen supply is inadequate, given off as carbon dioxide gas. The more resistant tissues, together with the microbial bodies, form the final composted material.

RAW MATERIALS FOR THE COMPOST.

Concisely, the raw materials used in composting are:—

(a) Waste organic matter.
(b) Nitrogenous material.
(c) Lime, etc., to counteract acidity.
(d) Moisture.
(e) Air supply.
(f) Potash and phosphate—not usually considered essential but if they do not hasten the process they at least increase the manurial value of the final compost.

(a) Waste organic matter.

Under our local conditions, the waste organic matter available includes market garden waste, straw, animal manure, urine, stable bedding, grass, weeds, lawn clippings, garden waste, prunings, shrubs and sawdust. Owing to their woodiness, vine and fruit tree prunings should be cut into short lengths and

mixed with other wastes that tend to compact. Or they may be stacked for a year before composting, to allow insects and the weather to render them more readily rotted.

Any materials tainted with oil, tar or any poisonous or preservative chemical should be avoided. Sawdust should be "sweetened" by mixing with ground limestone at the rate of 70 lbs. per ton of dry sawdust.

(*b*) *The Supply of Nitrogenous Material.*

The rapidity of the decomposition of plant materials in the compost heap is largely regulated by the percentage of nitrogen it contains, or which is added in the form of sulphate of ammonia, or as dung, or urine. The minimum nitrogen content required by micro-organisms to ensure rapid decomposition of the stack is usually taken as 1.5 to 2% of the dry matter. A nitrogen content below this figure will slow down the process, while one above it may lead to losses of nitrogen from the stack as volatile ammonia. It is a common experience to smell ammonia in the vicinity of manure heaps and stables. This means the loss of valuable nitrogen into the air.

Because of the importance of nitrogen content in successful compost making, it is of practical importance to classify our raw materials into two groups.

1. Low nitrogen content.
2. High nitrogen content.

The dividing line is roughly placed at 1.5% nitrogen (approximately 10% crude protein). It is well to bear in mind that the more mature a plant is, the smaller the percentage of nitrogen it contains. Therefore young, green materials make the richest compost. It is a good plan to mix both types of residues, for example, lawn clippings and straw, as this ensures better aeration and avoids loss of nitrogen as ammonia, which may occur if only wastes of a high nitrogen content are used.

Paper, sawdust and wood shavings have no direct manurial value, and may be harmful in the first year by causing the micro-organisms attacking them to compete with the crop for available soil phosphate and nitrate. If nitrogen and phosphate are supplied they can be composted to form a humus material that will improve the soil.

ORGANIC WASTES.

High Nitrogen Content.	Low Nitrogen Content.
Young green grass	Old dry grass
Soft green weeds	Cereal straw and chaff
Green legumes	Spoilt hay
Legume crop residues	Spoilt silage
Spoilt legume hays	Prunings
Animal manure and urine	Sawdust and waste paper

(*c*) *Neutralising or Correcting Acidity.*

The micro-organisms work best in a medium which is neutral to slightly alkaline. Acids are formed during the rotting process and to neutralise these, ground limestone, agricultural lime, burnt lime, wood ashes or soil are added. As much as 1 cwt. of ground limestone per ton of dry material (or 28 lbs. per

ton of green material) may be used to "sweeten" the compost heap. No harm will result from more liberal applications, but excess may cause loss of ammonia when only highly nitrogenous materials are used in the compost.

(*d*) *Moisture.*

The heap must be kept moist to promote rapid rotting. If dry straw alone is used it is necessary to add water when preparing the compost but no addition is needed with green stuff. During the composting period, from 15-20 inches of rain are considered necessary to maintain the heap properly moist. If the rainfall is inadequate, or is not taken advantage of, the deficiency must be made up by watering the stack.

(*e*) *Air Supply.*

The rotting process is also partly governed by the air supply. Either undue compaction or looseness is undesirable. To this end materials, such as green stuff, which compact readily, should not be built in a heap more than three or four feet high, or should be mixed with bulky wastes such as straw, prunings, etc. Bulky wastes can be built into a higher stack to cause compaction. Two to three times during the process the heap should be turned to aerate and mix.

(*f*) *Fertiliser Ingredients.*

A proper supply of nitrogen is necessary for rapid rotting and the addition of sulphate of ammonia is desirable with wastes low in nitrogen. Phosphate also accelerates rotting and improves the fertilising value of the compost and the addition of superphosphate is advisable. Potash does not usually affect the rotting but improves the supply of potash to the manured crop.

THE ADVANTAGES OF COMPOST MANURE.

The advantage of composts containing animal manure, over straight animal manure, are chiefly the greater bulk of manure obtained and the reduction in nitrogen losses. Urine is a very valuable nitrogenous manure and more attention could be profitably paid to the supply of sufficient stable bedding to absorb it, and finally placing this litter and dung on the compost heap.

S. D. Timson in the Rhodesia Agricultural Journal gives a tabulated comparison between kraal manure and compost. Kraal manure is comparable with what we know as stable bedding, mixed with dung and urine except that, in their case, coarser plant wastes are intentionally added, to be broken up by the trampling of the animals.

The adapted table is as follows:—

Points of Comparison.	Kraal Manure.	Compost.
1. Crop diseases and pests ...	Not destroyed	Destroyed—except certain tobacco diseases.
2. Weed seeds	Not killed	Killed if compost properly made.
3. Nitrogen losses	May exceed 78% ...	Small gains may occur.
4. Potash losses	May exceed 50% ...	Losses much reduced.
5. Utilisation of dung and urine	Wasteful of both ...	Dung utilised economically and urine partially.
6. Fly breeding medium ...	Ideal breeding ground ...	Cannot breed in properly made compost heap.

PREPARATION OF THE COMPOST HEAP.

Compost may be prepared in a number of ways. Where rainfall is plentiful it is best to build the layers above the ground to form a stack, or the materials may be composted in a bin open on one side. Under dry conditions and where drainage is good the pit method may be the easiest and safest to handle, as drying out is limited to the top layers.

Whatever method is adopted the procedure would be as follows:—

1. Put down a six-inch layer of the waste materials—lawn clippings, straw, etc., and sprinkle on 25 lbs. of superphosphate per ton of dry material. Any other phosphatic fertiliser, such as ground rock phosphate, could be used. If the materials are dry add sufficient water to moisten throughout but do not saturate. It is a good idea to moisten the layer partly with a thin slurry of animal manure, as rotting will be hastened owing to heavy inoculation with micro-organisms. When the compost is being made of poor waste materials the addition of a little muriate or sulphate of potash will improve the fertilising value.

2. Sprinkle the layer with lime or ground limestone at the rate of about 70 lbs. per ton of dry material. If green wastes are being composted use about 20 lbs. per ton of green material. Wood ashes are very useful when applied in the same way.

3. If animal manure is available and it is desired to use it in the heap, spread a layer half to one inch thick over the first layer. In this case, a sprinkling of soil or organic residues to cover the lime is desirable prior to applying the animal manure, as direct contact between the lime and the manure will cause a loss of ammonia.

Instead of the animal manure, sulphate of ammonia, if available, may be used at the rate of 75 lbs. per ton of dry material if wastes low in nitrogen, such as straw, are being composted.

4. Spread a layer of half to one inch of soil on top to conserve moisture and prevent the loss of ammonia. Clayey soils are much more effective than sands for this purpose.

5. Continue to build the heap by adding in sequence these layers treated in the same manner.

6. When the heap is finished—generally a height of three or five feet is sufficient—cover completely with half to one inch of soil or a suitable covering of old bags, etc.

7. Keep moist by adding water when necessary.

8. Turn the heap to mix and aerate the mass. A warm heap may be turned over after three to six weeks, while a cool heap should be left six to 12 weeks before turning. A second or third turning will accelerate the completion of the process but is not absolutely essential.

When the whole heap is uniformly dark in colour, with a pleasant earthy smell, and all the material is completely rotted, it is then ready for use. If not used immediately it should be well covered. It will not deteriorate with keeping.

Two cubic yards of moist, ripe compost weigh approximately one ton.

The Ministry of Agriculture and Fisheries of Great Britain in their "Grow-more" Leaflet No. 37, published in June, 1940, recommend a heap four to seven feet wide, three to five feet high and of any convenient length according to the amount of garden rubbish likely to be available. The following diagram is adapted from their recommendations.

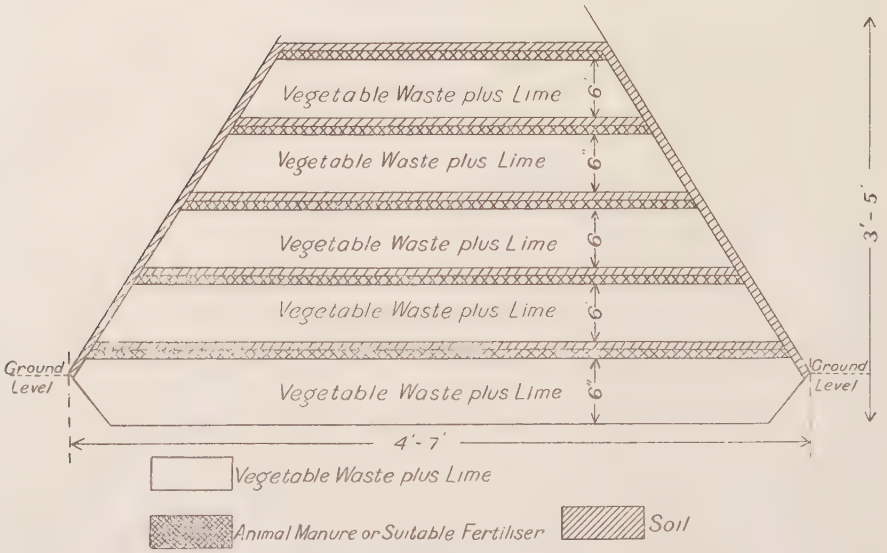


Diagram showing the layering of materials in building a compost heap.

ACKNOWLEDGMENTS.

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A Note on the Occurrence of Grey Mould or Botrytis Rot of Apples.

W. P. Cass-Smith, Plant Pathologist.

SUMMARY.

1. The occurrence of "Grey Mould" or "Botrytis Rot" of apples on the tree in Western Australia is recorded.

2. Symptoms of the disease are described.

3. The climatic requirements for infection by the fungus are discussed.

4. The conclusion is drawn that the disease is unlikely to make other than spasmodic appearances in this State.

The grey mould fungus is cosmopolitan in distribution and it includes a number of different strains which together comprise the collective species *Botrytis cinerea* persoon.

Usually the fungus lives saprophytically on dead plant parts or other dead organic matter, but under favourable conditions it is capable of changing its mode of existence and developing into a parasite with a wide host range.

In Western Australia the grey mould fungus (or what are probably different strains of the fungus) has been recorded as a parasite on plants widely separated botanically including lilies, roses, dahlias, gladioli, lupins, lettuce, etc., etc., and on apples, oranges, grapes, and other fruits in storage.

On the 28th of March last specimen apples of the Jonathan variety were submitted to the Agricultural Department by the manager of the Mount Barker Co-operative Co. with the information that they were affected with a type of rot which differed considerably from all other apple rots previously noticed.

The affected apples were obtained from a commercial picking made on the previous day and they were discovered as they passed over the grader. A few days later further specimens, including Yates, Grannies and Rokewood varieties, were obtained from the same orchard by the Superintendent of Horticulture, Mr. H. R. Powell, the symptoms being similar on each variety.

Isolations from diseased portions of the fruits were made immediately, and subsequently pure cultures of the grey mould fungus were consistently obtained.

As the disease was rather alarming to the growers and others concerned, and as no record of grey mould as a rot-producing organism of apples on the tree has previously been published from Western Australia, a brief account of the main symptoms is given in order that the disease may be recognised should it re-occur on any future occasion.

SYMPTOMS.

In each instance the rot commenced at the eye or calyx end of the fruit, the affected area being brown in colour and very firm in texture. The majority of the apples appeared to have been infected by the fungus through slight growth cracks (see Plate 1), but others showed no visible sign of injury even when examined with the aid of a good hand lens. In one case, however, the fungus had apparently

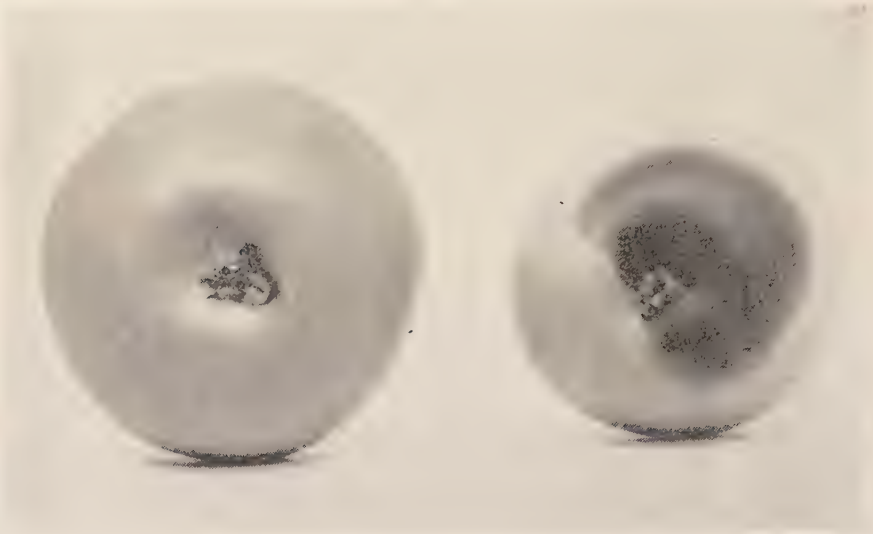

Plate 1.
Apples affected with "Grey Mould" or "Botrytis Rot" from Mt. Barker, March 1941. Note growth crack in "eye" region of "Granny Smith" apple on left through which infection occurred while the fruit was on the tree. The "Yates" apple on right shows the rot spreading down one side of the fruit which is a typical symptom of this disease.

Plate 2.
"Jonathan" apple from Mt. Barker, 1941, showing fructifications of the Grey Mould fungus which developed subsequently.

spread from the dead floral parts on to the surrounding flesh of the apple. As the rotted area enlarged it invariably spread down one side of the fruit (see Plate 1), the surface of the lesion being smooth and firm, and with a very clearly defined margin; later, however, it became wrinkled in appearance and softer to the touch. When affected apples were placed in a moist jar for a few days the ashen-grey fructifications of the grey mould fungus developed abundantly on the surface of the rotted areas (see Plate 2).

In order to discover whether the organism could infect uninjured apples or whether it should be regarded as a wound parasite, a number of apparently sound fruits of one variety were obtained. Half were wounded by slight needle pricks at the eye end and the remainder left uninjured, and both lots were inoculated with a suspension of spores in sterile water. Subsequently only one uninjured apple became infected, but the majority of the wounded fruits developed the typical rot. It would appear, therefore, that the causal organism is mainly a wound parasite, and can only infect uninjured tissue with difficulty, a conclusion in agreement with Cunningham's experience of the disease in New Zealand (1).

CLIMATIC FACTORS AND THE OCCURRENCE OF GREY MOULD.

Generally speaking, grey mould is regarded as a weak parasite only, and in Western Australia it appears to be most prevalent as a parasite during the wet winter months. It has been noticed, however, attacking various plants at other times of the year, especially during periods of high humidity and after heavy summer rains, and in the present instance its occurrence as a parasite of apples appears to be associated with similar climatic conditions.

RAINFALL DATA, MT. BARKER—1940–41 SEASON.

	Rainfall for Month.	Average for Month.	Daily Recordings during March.			
	pts.	pts.		pts.		pts.
October, 1940 ...	94	290	March 2	31	March 18	41
November, 1940	108	143	„ 4	1	„ 19	27
December, 1940...	194	107	„ 8	3	„ 20	3
January, 1941 ...	45	91	„ 11	4	„ 21	1
February, 1941 ...	30	90	„ 14	9	„ 23	13
March, 1941 ...	515	138	„ 15	112	„ 25	14
April, 1941 ...	217	208	„ 16	192	„ 27	1
May, 1941 ...	254	340	„ 17	62	„ 31	1

From the table above it will be noticed that the rainfall at Mount Barker in January and February was well below average, and that no large precipitation was recorded until March 15th, when 112 points were registered. Actually up to this time the season was one of the most adverse experienced in this district for many years, and by the middle of March the trees in many orchards were suffering very badly from lack of soil moisture. From the 15th to the 18th March, inclusive, however, very heavy rains occurred, some 407 points being recorded compared with the average for this month of only 138 points.

Coming after such a long dry period, this tremendous downpour was the cause of various non-parasitic disorders including cracking and splitting of apple fruits, and although no figures are available it is reasonable to suppose that atmospheric humidity was higher than usual.

Weather conditions at this time, thus appear to have been exceptionally favourable for the infection of apples by the grey mould fungus, and infection was no doubt facilitated by the cracks which developed in many fruits. It will be noticed also the disease was first discovered about a fortnight after the commencement of this wet period.

As far as the writer can ascertain from a search of departmental files, on only one former occasion has *Botrytis cinerea* been recorded as the cause of a rot of apples on the tree in this State.

In May, 1932, specimen Yates apples were forwarded from a Bridgetown orchard by Horticultural Instructor A. Flintoff, who made the following interesting comments: "The apples were affected on the trees. . . . You will note that the decay is at the side of the calyx in every case, and is not what would be termed a soft rot. . . . The only Yates showing the trouble were confined to a small block behind the homestead, and approximately 5 per cent. of the crop was affected."

The disease was identified as grey mould rot on this occasion by the former Government Plant Pathologist, Mr. H. A. Pittman, and it is noteworthy that the main symptoms mentioned by Flintoff are identical with those previously described herein.

It is also interesting to record that in 1932, the May rainfall figures for Bridgetown were almost two inches above the average.

It would thus appear that the strain of *Botrytis cinerea* causing a rot of apples on the trees in Western Australia requires a rather exceptional climatic environment for its parasitic development, and for this reason the occurrence of the disease is unlikely to be other than spasmodic.

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Studies on Orchard Soils in Western Australia.

By L. J. H. TEAKLE and L. T. JONES.

I.—THE ROOT SYSTEM OF THE APPLE TREE.

A.—The Distribution of Roots in a Soil Type at the Illawarra Orchard, Karragullen.

B.—Factors Affecting Root Growth and Distribution.

C.—The Functions of Roots.

A.—THE DISTRIBUTION OF ROOTS IN A SOIL TYPE AT THE ILAWARRA ORCHARD, KARRAGULLEN.

In the course of studies of nitrate-nitrogen and moisture contents of soils of apple orchards in Western Australia, an opportunity was presented for the observation of root distribution of well grown apple trees in a soil type at the Illawarra Orchard, Karragullen. The experimental work in this orchard was commenced in February, 1939, and was designed to follow the changes in the soil under the influence of ordinary crop growth with that in sections of soil from which the root growth had been eliminated. To this end, trenches were dug to a depth of three feet around blocks of soils between selected trees and sheets of galvanised iron inserted to prevent subsequent root penetration. Observation of root distribution showed that this was adequate to cut off root action at least for a period of about one year. While the trenches were open, the nature and distribution of the roots in the soil were carefully noted and mapped. Figures 1 and 2 show diagramatically the root types and their distribution at representative sites. The moisture and nitrate-nitrogen status of these isolated plots was compared with soils from adjacent plots sampled (a) under normal orchard practice (winter cover crop and clean summer cultivation); (b) under normal orchard practice except for complete removal of the cover crop (clean cultivation).

The Soil.

The soil of the area selected for the experiment was reasonably uniform. The general profile features were—

6 in.	dark brown sandy loam ± small gravel.*
18 in.	red brown sandy loam to clay loam ± gravel.*
30 in.	brown clay with red, pale yellow, and grey mottling but more yellow with depth + varying amounts of gravel.*
	yellow tight clay with red and grey mottling + varying amounts of gravel.* Decomposed rock observed usually from 36–42 inches.

* Chiefly ironstone (laterite).

The trenches revealed that some variation occurred in the thickness of the important soil layers, although the soil in the area under investigation could be regarded as of the same type. Most important was the fluctuating depth of the tight, yellow clay subsoil which ranged from 24-36 inches. Root penetration into this layer was rare, so that the feeding zone was confined to the superficial layers.

The Roots.

Five blocks of soil eight feet square were isolated by trenches three feet deep between the selected trees. The trees were spaced 20 feet apart and the north and south root exposures visible on the face of the trenches were six feet or more from the base of the nearest tree. In opening the trenches, it was of interest to note that there was a correlation between the relative ease of digging and the penetrability of the soil layers for roots. On the average, down to 18 inches the soil dug easily, from 18-30 inches it was fairly hard, while a crowbar had to be used to loosen the tight clay subsoil below this depth.

The trenches were dug in the middle of summer, February, 1939. At this time there were practically no roots in the surface six inch layer owing to the cultivation. Generally speaking, the maximum concentration of roots was found in the layer between 9-18 inches with a lesser concentration from 18 inches to the yellow tight clay subsoil. Occasionally a large root was able to force its way into this compacted subsoil layer, but generally it was devoid of apple roots.

Vigorous root activity was noted where the soil had been disturbed in laying tile drains (see Fig. 1). Decayed jarrah or red gum roots were also the scene of enhanced root activity. In one instance, on the site of a burnt-out tree stump, great root activity was induced amongst the filled-in soil and ashes. At another site, an excavation filled in with friable surface soil showed excellent root growth.

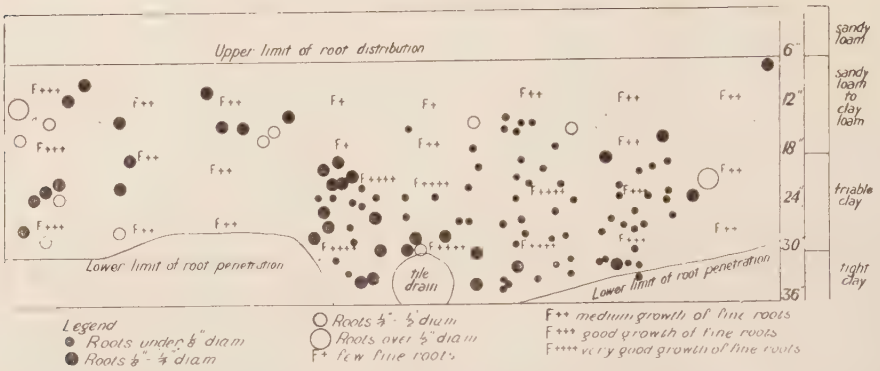

Fig. 1.—Root exposures in trenches 8 feet long by 3 feet deep, at Illawarra Orchard, Karragullen. Note the influence of a drainage trench on root development and distribution. (Plot 7—West Face.)

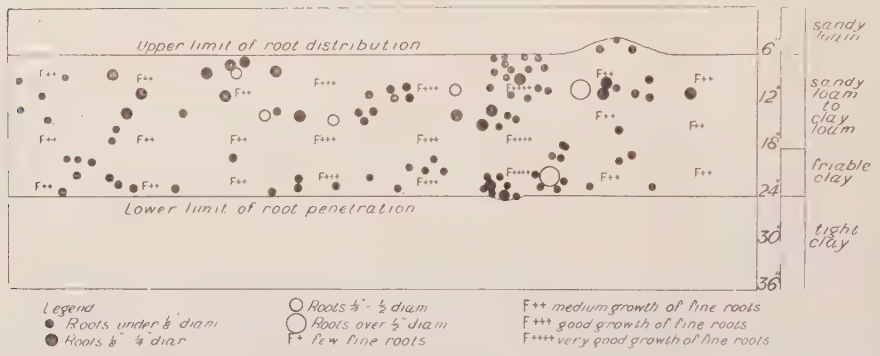

Fig. 2.—Root exposures in trenches 8 feet long by 3 feet deep, at Illawarra Orchard, Karragullen. Note the influence of a compact subsoil on root penetration. (Plot 14—South Face.)

In the course of the monthly samplings for nitrate-nitrogen and moisture contents, the root types, their distribution and activity were observed in those plots sampled under normal orchard practice and clean cultivation. It soon became apparent that the tree roots could be classified into three main types:—

1. Fine, soft, white silky roots which appeared to be active for short periods during autumn (commencing in April) and spring (commencing in September) when the soil was warm and moist.

2. Young, yellow brown roots, up to about ⅛ inch in diameter, from which the fine white roots of the first type appeared to grow. At the time of digging the trenches many of the finer roots of this type were exposed in the 9-18 inch layer. On portions of the exposure they were so concentrated that they formed a hairy surface until they shrivelled in the hot sun and drying atmosphere, and disappeared in the course of 15-30 minutes. These roots are indicated by the letter F in figures 1 and 2.

3. Aged, dark brown suberised roots.

Early in February, 1940, the plots were irrigated under the furrow system, which failed to moisten the surface soil between the furrows. No changes were observed at the March sampling, but in the middle of April, yellow brown, young healthy roots of type 2 were noticed growing actively in the 9-18 layer. At the next sampling, early in May, when the soil was well moistened, the growth of these roots was still very active. On the clean cultivated plots, where the roots of weeds

did not confuse the situation, and in cases where the surface soil was not compacted, new, fine, white roots were observed at this May sampling growing upwards from the nine inch layer into the surface soil. Prior to this sampling, the surface soil had been thoroughly moistened by the autumn rains. The production of these roots of the first type corresponds to the moistening of the surface soil, and, in this instance, follows the renewal of activity of the yellow brown roots of the second type.

These roots did not appear to be making growth during the winter, but, early in September, after a fall of two inches of rain, followed by a week of warm weather, renewed activity of the fine white roots was observed at a depth of 9-10 inches at two sites.

B.—FACTORS AFFECTING ROOT GROWTH AND DISTRIBUTION.

For vigorous root growth the soil conditions must be suitable. Most important factors are moisture, aeration, supply of nutrients and soil penetrability.

Moisture.

It is universally recognised that the soil must be moist for healthy plant growth. Again, there are limits of moistness, outside which conditions are unsatisfactory. A soil should never contain more water than is held after rain or irrigation when drainage is free (field capacity), and the plant cannot absorb water fast enough for growth if the soil is drier than the wilting point—or wilting range, as some people now call the condition. The wilting point is the moisture content of the soil at which a plant will wilt and not recover unless water is added. The available moisture may be regarded as that contained in the soil between the wilting point and field capacity.

On deep loamy soils in California, Hendrickson and Veihmeyer (1934) found very little difference in the rate of absorption of water by prune trees as the moisture content varied between field capacity and wilting point. By analogy, a motor car will run just as fast whether the petrol tank is full or nearly empty. In irrigation practice these authorities suggest delaying watering until just before the wilting point of the soil is reached.

This recommendation has not received general support on account of interfering factors. It is well established that, particularly on clayey soils, lack of readily available water interferes with the development of apples, pears and citrus —especially with respect to fruit growth—when the soil is reduced below the mid-point between field capacity and the wilting point. (Allyn, R. B., and Work, R. A., 1941.) For apple orchards of the eastern United States, Magness, Degman and Furr (1935) suggest measurement of the rate of fruit growth as a means of determining the availability of soil moisture and as the best indication of the need for irrigation.

The ability of a fruit tree to reduce the soil almost to the wilting point without suffering from water deficiency will depend largely on the variety, the nature of the soil, and the efficiency with which the roots are distributed through the soil mass. Clay soils, particularly when tight and compacted, will be less suitable than open, loamy types.

Aeration.

Aeration has been proved of paramount importance for fruit tree roots. In fact, it was not possible to grow fruit trees in water culture until a system of continuous aeration was adopted. Roots penetrate best in deep sandy loams. Any layer which impedes aeration is harmful; for example, an unbroken film of mud over the surface may restrict the air supply to the roots and prove deleterious, and

roots are generally not vigorous where there is a heavy clay subsoil, probably due at least in part to restricted aeration. In fact, Furneaux and Kent (1937) ascribed a disorder colloquially known as "The Death" to root suffocation in clay soils following periods of wet weather. The main trouble in cases of restricted aeration appears to be due to an accumulation of carbon dioxide which is given off by the growing roots just as by living animals. If aeration is too restricted, the carbon dioxide content of the soil in the vicinity of the roots may increase to a concentration which is harmful. The process is just the same as in a poorly ventilated room filled with people. Conditions soon become unfavourable and, later on, distressing.

Supply of Nutrients.

Root growth will also be restricted in impoverished soils owing to mineral starvation. Much can be done to improve such soils by generous fertiliser applications and suitable management practice.

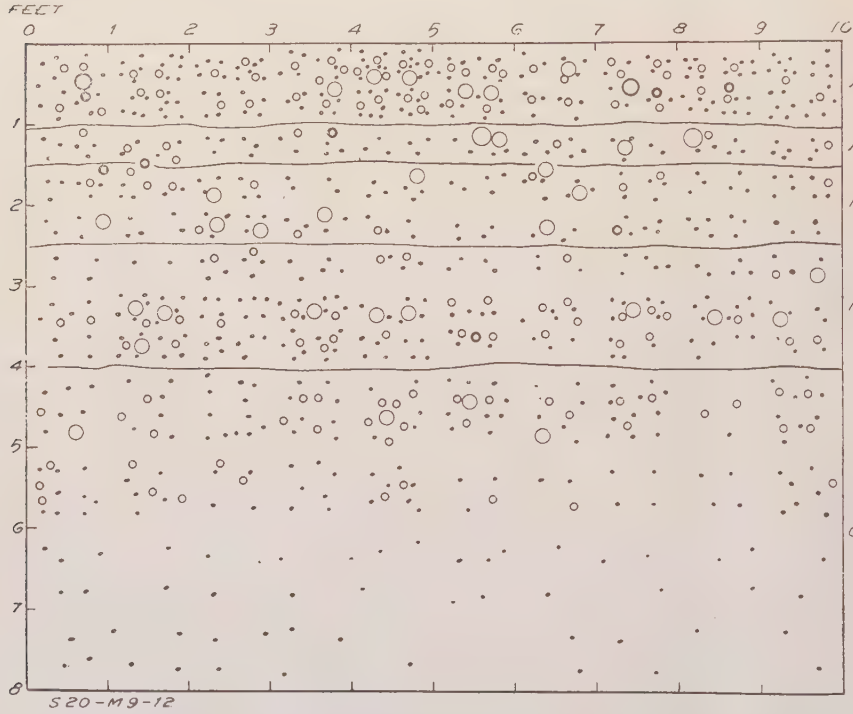

Fig. 3.—Root Distribution on Ottawa Loamy Fine Sand.

A_1, medium brown loamy fine sand; A_2, light yellow-brown loamy sand; B_1, yellow loamy sand; B_2, grayish yellow loamy sand; C, light yellow-brown loamy sand. Rooting extended below 8 feet in this profile. Boynton, 1938.

Soil Penetrability.

To illustrate the effect of soil profile characters on the distribution of roots of apple trees, figures 3 and 4 are reprinted from a paper by Boynton (1938) giving the results from soil types in New York State. Figure 3 represents Chart 1, showing the root distribution in the Ottawa loamy fine sand, one of the most satisfactory orchard types of the State. From the description, it will be noted that the soil is light in texture throughout, and penetrability is such that the roots have reached to a depth below eight feet. Figure 4 shows the root distribution on the Lansing silt loam. This soil does not permit such extensive root development owing to a

very compact glacial till at a depth of about three feet. This soil type is only of average productivity for apples.

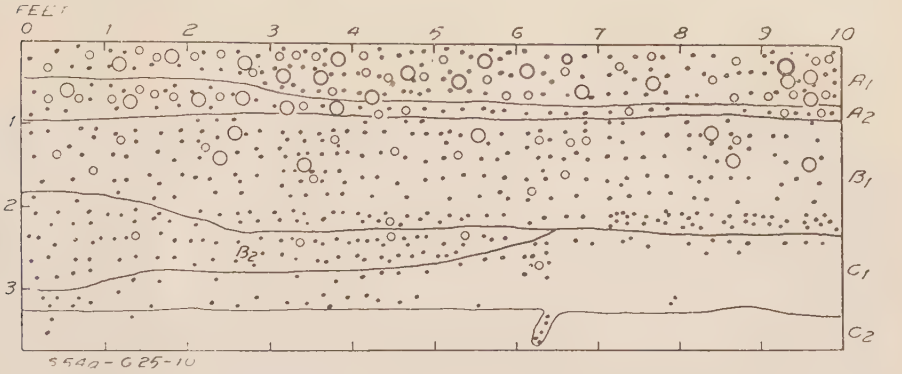

Fig. 4.—Root Distribution on Lansing Silt Loam.

A_1, medium brown friable silt loam; A_2, light orange-brown silt loam rather compact; B_1, olive-brown heavy silt loam, grey and rusty mottlings; B_2, calcareous light reddish brown silty clay loam, grey and rusty mottlings; C_1, calcareous olive-brown silt loam, compact; C_2, calcareous olive-brown silt loam, very compact—unweathered glacial till. Boynton, 1938.

For orchard soils factors interfering with ready penetrability by the roots are undesirable. A high water table results in the death of the roots affected and restricts growth. Hardpans at shallow depths are equally disastrous. Tight clay layers will restrict root development. It seems that apple roots are less able to pentrate tight clay soils than, for instance, pears. Only when the clay is friable, that is, the particles are aggregated into crumbs, and the soil, therefore, behaves as a loamy type, is penetration satisfactory. At the Illawarra orchard, the yellow clay subsoil was in an unsatisfactory condition for root penetration and, consequently, the roots were practically confined to the upper layers which were easily penetrable, although the clay content of the upper subsoil was quite high. The same restriction to root development occurred on the Lansing silt loam in New York State.

Even where soils are readily penetrated by roots, in most soils the bulk of the roots are in the surface layers, perhaps to a depth of two or three feet. West (1934) has given information for citrus on a sandy loam soil at Griffith, New South Wales, showing the greatest concentration to be in the 6-24 inch layer. Citrus are recognised to be shallow rooting trees, but even with deeper rooting types such as apples, the greatest concentration is in the upper layers of the soil.

In the surface layers is the main nutrient supply which encourages the development of feeding roots. Unfortunately, in Western Australia, under the dry weather conditions of the growing period, without irrigation early moisture depletion occurs in this layer and undoubtedly interferes with root activity. Evans (1937) states that, for sugar cane, a dry surface stops absorption to a considerable degree and may cause mineral starvation. Whether this occurs with fruit trees has not been determined.

Root activity is seasonal. It is easy to observe the seasonal activity of the aerial portions of the plant, flowering, leaf formation, fruit formation, etc., but the activity of the root is obscured by the soil. In the study discussed above, it seems that for apples the periods of greatest root activity in Western Australia are the autumn and spring months when moisture and temperature conditions are favourable.

Hofmann has arrived at similar conclusions for America. Over a period of 10 years' observation, he observed that active development of feeding rootlets occurred in the autumn and spring months, and there was a definite stop in root

activity for a period in the summer. He also concluded that the spring resumption of rootlet activity after a dormant period in the winter was rather slow, and it often took until the middle or latter part of April for maximum rootlet activity. April in America would correspond to October in Australia.

C.—THE FUNCTIONS OF ROOTS.

The roots, for all their obscurity, are of utmost importance in the growth of the plant; they fix the plant and enable it to withstand the elements; they absorb the water supplies from the soil; they collect the mineral requirements vital for nutrition.

Strong roots, well distributed through a deep permeable soil, mean favourable conditions and will correlate with large and vigorous top growth. A soil with an impermeable layer at a shallow depth not only restricts the root growth, but also may limit top growth, and trees on such soil types will be stunted.

In maintaining the moisture supply for the plant, the roots have to make use of the available supplies in the soil. It must be remembered that capillarity will be of little or no importance in supplying moisture to the roots—the roots must go after the water and, to be effective, the plant must be strong enough to produce a close network of vigorous absorbing roots throughout the soil mass. Rate of absorption of water is practically independent of the soil moisture content over the bulk of the range between field capacity and the wilting point, and efficiency in absorption will be dependent upon the root distribution. As capillarity is ineffective in the supply of water to the roots, any condition restricting the ability of the roots to contact all parts of the soil mass will result in the tree suffering from moisture deficiency before the wilting point of the soil mass as a whole is reached.

At least 12 essential elements are absorbed from the soil by the roots in amounts ranging, for apple trees, from nearly 100 lbs. per acre annually, in the case of elements such as potassium, to a fraction of an ounce for some of the micro-elements. The bulk of these substances are absorbed from the surface layers of the soil where they are made available partly by the biological activities of the soil, partly by simple solution and by the addition of fertilisers. Most of the elements are required most urgently at the commencement of active vegetative growth, but absorption continues throughout most of the growing period. Toward the end of the cycle there may be some return of elements to the soil via the roots. Potash has been observed to migrate to the roots and return to the soil; nitrogen and phosphate may behave similarly.

Some of the minerals are absorbed from the soil solution, that thin film of moisture in the soil which, where conditions are fertile, contains nitrates, potash, lime, sulphates, etc., in considerable amounts, and minute quantities of phosphate and other requirements. Fertilisers and suitable management assist in the maintenance of a rich soil solution, but it is now established that plants are not confined to the soil solution for their supplies; they may take certain substances from the finest fraction of the soil in contact with the root hairs by a system of interchange. In fact, Jenny and Overstreet (1940), in California, have found that plant roots are able to absorb substances directly from dry soil particles. They caused labelled* potassium and sodium to be absorbed by clay. It was then dried and placed in contact with the plant roots. Subsequently it was possible to trace the movement of these elements absorbed from the dry clay by the roots and transported throughout the whole of the plant.

Most work on absorption has been done with annual plants and little is known of the process in trees. For apples, it is generally conceded that nitrogen supplies should be available a little before flowering. Absorption appears to continue during the period of rapid vegetative growth in the spring, but during the dry Western

*Artificially radioactive.

Australian summer the soil seems to accumulate an excess of nitrate. Is this because the top soil is too dry for nitrate absorption? The evidence is too inadequate and contradictory for definite conclusions. There is evidence, however, that considerable nitrate absorption occurs with the renewal of root activity in the autumn.

It may be asked how the roots absorb the nutrients from the soil. Again Californian work gives the answer. The roots literally pump from the soil mass the substances available to them, either in solution or adhering to the clay particles. To do this they use their food stores as a source of energy. Any failure in the air supply which will restrict the ability of the plant roots to breathe will limit the use of this food. Consequenty, the roots will be restricted in their capacity to pump in the nutrients. Thus, by inadequate aeration of the soil, or any other factor interfering with the normal metabolism of the roots, the tree will be robbed of its nutrient requirements irrespective of the supply.

The rooting system of the apple tree is conditioned by the nature of the soil profile. While the bulk of the most active roots normally occur in the top three feet of soil, in deep, permeable soils, root penetration may be to depths of 10 feet and more. Even where such a soil is only moderately supplied with mineral requirements, it would be eminently suited for apple culture if other environmental factors were satisfactory. Tight clay layers, hardpans, and water tables restrict root penetration and such restriction is commonly correlated with reduced top growth. Shallow rooting systems mean susceptibility to drought, small foraging capacity for minerals and the trees rarely make much height. In selecting sites for apple orchards, in fact, for any orchard, it is necessary to ensure that the soils are deep, permeable to moisture and roots, well drained, and contain at least moderate amounts of the mineral requirements of the trees.

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Acknowledgment.

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Some Facts Relating to the Growing of Tung Oil Trees in Western Australia.

H. R. POWELL,
Superintendent of Horticulture.

The early attempts to establish the Tung Oil Tree (*Aleurites Fordii* Hemsl.) in this State from the time the first nuts were obtained departmentally from the Royal Botanic Gardens, Kew, until 1938, have been reviewed in an article by Meadley.* During that period, nuts were forwarded to many widely separated localities for experimental plantings, but unfortunately, little success was achieved.

During 1937, enterprising salesmen were responsible for the sale of approximately 60,000 trees imported from New South Wales. In 1938, a five-acre nursery was established at Armadale by Mr. A. S. Mann, at that time the representative in Western Australia for Tung Oil Mills, Ltd.

A number of plantations, mostly on a small scale have now been established in various districts including Mt. Barker, Albany, Bridgetown, Mundaring, Mt. Helena, Byford, Chittering, and on the Hampstead Hills Estate. For the most part, the trees have been planted on poor soils such as gravels and sandy loams, although in some instances good orchard soils have been utilised. Generally speaking, the trees have made poor growth.

Interesting variations in the habits of growth have been noticed at different centres. At Byford, trees growing on the banks of a small stream are single trunked and multi-storied in much the same way as the Norfolk Island Pine. From limited experience it would appear that they conform to the habit of growth of the tree in its natural state. Trees in a plantation in the Mundaring district have made entirely different growth. These trees continued their growth from year to year but did not branch until they were 6-8 ft. from the ground. Though staked, they suffer severely from wind damage. This type of tree has little to commend it. Elsewhere, the trees are mostly low headed, but the branching system is of the carriage-wheel type.

Advice given to purchasers of trees, particularly in 1937, was to the effect that the trees would grow anywhere. It was further pointed out that not only were no fertilisers required but, that as the trees were so remarkably hardy, even ploughing and cultivation could be dispensed with. This advice, coupled with neglect as later information stressed the necessity for fertiliser and cultural treatment, and the harsh growing conditions of the past two seasons, are partly responsible for the poor condition of the majority of the trees to-day.

I say partly responsible, as it has yet to be demonstrated that commercial areas of trees, excepting a few fairly good trees here and there, can be successfully grown.

Experiments have now been designed to ascertain the effects of fertiliser and sound cultural practice on areas of trees in several selected localities and if it is established that the trees can be successfully grown the first phase of the investigation will have been concluded. In the second phase efforts would be directed to the selection and propagation of desirable type trees. This would be necessary as most Tung trees in Australia and elsewhere are seedlings. Extreme variation exists in the habit of growth, yields, proportion of kernel to shell and possibly also in the oil content, of individual trees.

Although there are no plantations on a commercially profitable basis in Western Australia, it is well to remember that it is doubtful whether any country outside China, has as yet, reached the stage of profitable development.

* The Tung Oil Tree. *Jour., Dept. Agric., W.A.*, June, 1938.

Tung trees have been largely planted in the United States of America and year by year the area has increased rapidly. In 1940, the estimated area was 175,000 acres, chiefly planted in the narrow coastal belt round the Gulf of Mexico, where the annual rainfall ranges from 50-60 inches. Dr. Ashby† in his survey of the American Tung Oil Industry makes the following interesting comment on production in that country.

"Records of mature trees in the horticultural test grounds at Gainesville University show that the average yield of nuts from 10 trees over a 13-year period (from 9th to 21st year) to be 22.7 lb. The individual trees, which are well grown and in healthy condition, have 13 year averages ranging from 4.7 lb. to 67.3 lb., there being four occasions on which the heaviest cropper bore 90 lb. of nuts or over, while the record yield was 164.8 lb. In the field, average yields of about 10 lb. per tree are more general, working out at some 500-600 lb. per acre under the spacings most commonly adopted. 500 lb. of nuts per acre is regarded as a good yield in large areas, even when frost damage is very slight, and under present conditions growers can hardly expect to maintain this figure."

From 500 lb. of nuts approximately 190 lb. of oil can be obtained. Having this figure in mind the grower will naturally ask, "What is the financial return?" and I am indebted to Mr. A. H. E. McDonald, Chief of the Division of Plant Industry, N.S.W., for the following particulars:—

At the mills of Tung Oil Mills, Ltd., Sydney, nuts are acquired on a sharing of profits basis and the grower receives a minimum of 4d. per lb. for entire nuts at the factory plus 50 per cent. of the net surplus on realisation. In practice the grower receives 50-55 per cent. of the value of the oil which under pre-war conditions sold at £90 per ton or 9½d. per lb.

On a return of 190 lb. of oil per acre, the grower would receive £3 19s. 2d. at the company's mills, Sydney. I understand that at the present time the value of the oil has doubled and, this being the case, the return to the grower would be in the region of £8 per acre.

It is thus fairly obvious that, unless yields can be built up to a much higher figure than the average quoted, very little can be expended on the maintenance of the plantation. Under such conditions it is yet to be proved that yields approximating 190 lb. of oil per acre will be produced.

† Tung Oil Industry of the United States, *Bulletin of the Imperial Institute, Vol.* 38, No. 1, 1940.

Seasonal Hints on the Care of Milk and Cream.

With the approach of warm weather, and particularly during periods of high humidity, it will be found that unless special care is taken in methods of producing milk and cream, "off flavours" will develop much more quickly and to a greater extent than is the case during the colder winter months.

The majority of these flavours causing low quality, are brought about by the action of bacteria, which break down the various milk constituents to form other substances foreign to a high class product, and of course the greater the numbers of bacteria in the product, the greater will be the decomposition of the milk solids contained therein, resulting in a corresponding drop in quality.

Effect of Temperature.

The prevailing atmospheric temperatures during spring and summer are similar to that of the milk as it leaves the cow and are very favourable for the growth of the types of bacteria concerned; therefore every effort should be made to remove the animal heat from the milk immediately it is produced. This applies particularly where milk is held overnight to be delivered to cheese factories the following morning.

Cool the milk by standing the cans in water deep enough to come well up the sides; stir the milk frequently and renew the water at least once if possible. Remember that in this method the cooling proceeds from the outside inwards, and if the milk is not stirred, a proportion in the centre of the can will remain at blood heat until perhaps midnight.

If using a surface water cooler, the cooling is done more rapidly, but it is still advisable to stand the cans in water afterwards as above. The temperature of the water used is important; it should be procured direct from a deep well if possible. In the case of cream, the milk must be separated warm to prevent excessive fat loss, and the cream then immediately cooled as above. With surface coolers for cream, which are attached to a canvas water bag, fill the bag as soon as one separation is finished and hang in a shaded, draughty place ready for the next separation, as the water then drops in temperature due to evaporation from the bag, and has a better cooling effect on the cream.

Storage.

Store cream in a cool place away from other products such as, meat, bacon, onions, fruit, and keep it away from the atmosphere of the bails and yard. Stir three times a day with a metal stirrer, cover with fine gauze to protect from dust and flies, and avoid exposure to direct sunlight during storage and while awaiting transport.

Do not mix warm and cold creams.

Hot Water Supply.

Probably the greatest necessity on a dairy farm for the production of a high quality product is an adequate supply of boiling water. Too frequently we find farmers who are content to try and wash a milking machine, with three or four buckets, and a separator with about four gallons of water, which may or may not be hot.

A ten or fourteen gallon copper, bricked in for preference, and sheltered from the weather, is essential in a dairy, and will provide abundance of boiling water for washing and sterilising purposes, for the expense of a minimum amount of wood.

Care of Equipment.

All milk handling equipment should be washed and sterilised immediately after use. The practice of leaving the separator unwashed overnight is the cause of much second grade cream, and is a dirty habit. First rinse with cold water, then wash in warm water containing soda and finally dip in boiling water. A wire netting basket, which will hold the separator parts, and fit in the copper is handy for this purpose, or failing that, place the washed parts in the milk holding bowl and pour a bucket of boiling water over them.

Cream cans, buckets, strainers, etc., require similar treatment. Remember too, that if sterile utensils are placed on a dirty, milky bench to drain, they again become contaminated and the job has been done for nothing. With milking

machines, immediately the last cow is finished, draw cold water through the machine (one gallon to each unit) then the same amount of boiling water containing caustic soda at the rate of one teaspoonful per four gallons of water, and finally the same amount of clean boiling water.

The double lot of boiling water in addition to cleansing and sterilising the plant, leaves it so hot that it will dry almost immediately, obviating patches of moisture in which bacteria will multiply.

Where machines are equipped with sight glasses it is advisable to use lukewarm water instead of cold for the first rinse, to prevent glasses breaking through too great a difference between the temperatures of the first and second rinses; also slightly release the tension on the holding down spring clip to allow the glass to expand.

The air system on all machines is a very potent source of contamination; it should be closely watched, and the vacuum tank and all rubber tubes connecting the milk and air systems should be removed and washed in the ordinary daily washing routine. Normally, no milk passes through these tubes, but with the swirl of milk in the milk pipe and releaser, a vapour passes through them, which carries sufficient milk solids to create a breeding ground for harmful bacteria.

Owing to the fact that the milk does not reach these parts, they are not reached by the water in the normal washing, hence the necessity for their removal to be washed separately. Rubber ware which has perished and become cracked and spongy should be replaced as soon as this condition is noticed.

Dismantle the whole machine at least twice per week, and wash each part separately. Ordinary washing soda should be used for washing all equipment other than milking machines.

Defects in Cream and how to remedy them.

Over-ripe Cream.—Caused by bacteria developing excess acidity; skimming too thin, and infrequent deliveries to the factory. Skim to 40 per cent. test. Cool and aerate the cream on the farm and deliver daily when possible.

Staleness is due to cream being allowed to age. Send all cream in the dairy to the factory on the days of delivery. Keep cream cool and stirred while on the farm.

Curdy Cream.—Caused by skimming too thin, and mixing warm cream with cold. Remedy as for over-ripe.

Fermented Cream.—Is due to the action of a particular type of bacteria which breaks down the milk sugar forming gas which appears as minute bubbles in the cream, and will cause it to foam and give off a disagreeable odour.

This trouble is mostly the result of unclean methods in the dairy work. Separating the cream too thin and lack of cooling accentuates it as does also the mixing of warm and cold cream. Give strict attention to cleanliness of plant and premises, using boiling water to rinse the utensils after cleansing morning and evening.

Hands of milkers should be clean, and cows' udders and teats washed. This last can be made easier by clipping the hair around the tops of the teats. Treat also as for over-ripe cream.

Unclean Flavour.—Is due to general unclean methods of handling, and especially to the use of unboiled cloths for washing utensils. Use scrubbing brushes for washing purposes and give them an occasional boil and put in the sun to keep in a sweet condition. May also be caused through absorption of odours from unclean condition in bails, such as pools of urine lying on floor.

Albuminous Flavour.—This flavour is caused by using the milk of unhealthy and newly calved cows and those approaching calving. It is not advisable to use the milk of cows until at least seven days after calving. Watch cows for signs of sickness.

Feedy.—Due to rank pastures or those containing a high proportion of subterranean clover, cape weed, etc.

Remove cows from this type of pasture at least two hours prior to milking if possible, and do not give any highly flavoured feed in the bails. Cool and aerate cream on the farm.

Metallic.—Due to friction of cream on tinware in hot conditions, and to the action of acid creams on rusty utensils. Keep cream as cool as possible until leaving the farm and have rusty cans, etc., retinned.

Milk Fever *(Parturient Hypocalcaemia)* in the Dairy Cow.

C. R. Toop, Senior Veterinary Surgeon.

The condition known as milk fever is almost essentially a disease of parturition or calving and principally affects those animals which are noted for heavy milk production. The earliest cases of the disease were recorded in the year 1806, and it is interesting to note that their occurrence was coincident with the period when it became customary to feed dairy cows more liberally for the purpose of increasing production. Since that time in association with improved agricultural methods resulting in a much heavier growth of crops and pastures and the evolution of a type of dairy cow with a capacity for high production, the incidence of the disease has steadily increased and it may therefore be regarded as a concomitant of high production, coupled with generous feeding. Consequently, the beef breeds and the poorer types of dairy cattle are rarely affected, whereas breeds, or individuals noted for their heavy yields, are especially susceptible. Even amongst the latter, however, the attack does not usually occur until the peak of production has been reached. Hence, we find that the disease rarely affects heifers and is uncommon amongst cows in their second season. Mature cows on the other hand are quite frequently attacked, susceptibility being greatest between the sixth and tenth years of age, i.e., the period during which maximum production has been reached and over which it is usually maintained. Older animals in which the milk yield has commenced to decline are less susceptible.

Occurrence.

The great majority of the cases of milk fever occurs within the first three days after calving and the animal may become affected at any time during this period. Exceptionally, the attack occurs immediately before calving, or even while calving is actually in progress. This disease is not, however, wholly confined to the parturient period. Occasionally it affects animals which have been milking for a period of weeks or months. These cases of so-called "Delayed Milk Fever," mainly occur when cows are running on succulent pastures, and are often associated with the period when the animal is in season.

Cause—Hypocalcaemia.

For more than a century the cause of milk fever remained a mystery and it was not until the year 1925 that the British workers, Dryerre and Greig, succeeded

in demonstrating the true nature of the condition. They were able to show that the disease was always associated with a fall in the calcium content of the blood; this condition being known as hypocalcaemia. During the examination of a large number of cases of milk fever it was found in every instance that there was a definite reduction of the calcium content of the blood, which corresponded with the severity of the symptoms. In severe cases the blood calcium had fallen to as much as 70 per cent. below its normal level, while in mild cases the reduction was correspondingly smaller. Moreover, following upon the inflation of the udder with air, the blood calcium steadily rose, until the normal level was reached, this rise corresponding with the improvement of the condition of the animal, and the gradual disappearance of the symptoms. Finally, it was shown that affected animals could be restored to health by the injection of calcium solutions into the jugular vein.

Calcium is stored in large amounts in the bony structures of the body. It is present in the blood in small, but fixed and definite amounts and is essential for the maintenance of certain of the vital functions of the body. Should the blood calcium fall appreciably below its normal level these functions cannot be maintained and symptoms make their appearance.

How this sudden fall in the blood calcium level is brought about is not definitely known. Calcium occurs in high concentration in the colostrum of first milk secreted and it might therefore be expected that a heavy drain upon the calcium contained in the blood would occur when lactation commences. Normally, this depletion would be made good by a rapid transfer of calcium from the reserves stored in the bones, this being brought about by the secretion of the parathyroid glands, which play an important part in regulating and maintaining the blood calcium level. It has, therefore, been suggested that the disease has its origin in a temporary failure on the part of the parathyroid glands to function. Proof of this is, however, lacking.

Symptoms.

The affected animal is usually in good condition. The attack is sudden in onset and generally follows a simple uncomplicated calving. The initial symptoms are of short duration and may pass unobserved. They consist of restlessness, excitement, and trembling. Soon the gait becomes floundering and unsteady, the forelegs are spread widely, the hindquarters sway, and the animal knuckles over on the hind fetlocks. After a short period the cow is unable to keep her feet and falls to the ground lying awkwardly on the brisket with the head turned sharply in to the shoulder. This posture is very characteristic of the disease, and if the neck is straightened out, the head immediately returns to its original position when released. Soon the animal sinks into a condition of deep coma, lying full length on its side with head extended, and legs outstretched. The breathing is laboured and stertorous, being audible from some distance away. The temperature is normal and in some cases subnormal. Hence the popular term milk fever is a misnomer. The udder usually contains little milk.

Before an effective method of treatment became available the mortality rate was high and it is stated that 50 per cent. to 60 per cent. of the animals which became affected died of the disease. With the methods of treatment now practiced the mortality rate probably does not exceed one per cent.

Treatment.

Two methods of treatment are available (1) the inflation of the udder with air, (2) the subcutaneous injection of calcium borogluconate solution. Both methods are very effective.

(1) *The inflation of the udder with air.*

This method consists in inflating each of the four quarters with air, until they are firmly distended. A milk fever outfit is used for this purpose. This consists of a pump similar in type to a bicycle pump to which is connected in series, an air filter, and a teat syphon (tube). Immediately before use the air filter and teat syphon are sterilised by immersion for ten minutes in boiling water, and the air filter, which consists of a hollow metal cylinder, is packed with dry cotton wool. Meanwhile, the udder is prepared by thorough washing with an antiseptic solution such as lysol or dettol in the strength of two ounces to five pints of water, and a cloth which has been steeped in this solution and then wrung out is placed beneath it. The sterilised teat syphon is now introduced into the teat canal and air is pumped in until the quarter is firmly distended. Each quarter in turn is dealt with in this manner and when the inflation is completed the teats should be grasped firmly and the udder massaged. It is a common practice to ligature the teats with tapes for a period of two or three hours to prevent the escape of air. This procedure, however, is unnecessary, and it may lead to the development of a troublesome stricture, if the tapes are allowed to remain in position too long. Having inflated the udder the cow is now propped up with the aid of bags filled with earth or sand so that she rests comfortably on the brisket. If the animal is allowed to remain prostrate, bloating will occur and death may result from asphyxia. Medicines must on no account be given by the mouth. When the animal is in a state of coma, swallowing cannot occur and should a drench be administered it will flow directly into the lungs and may subsequently set up an attack of pneumonia. In carrying out this treatment great care should be exercised in the sterilisation of equipment and the cleansing of the udder and teats, otherwise infection will be introduced into the udder, which may result in an attack of mastitis. Following upon the inflation of the udder, recovery is usually rapid and in the majority of cases the animal will have been restored to complete health within the space of a few hours. If recovery has not occurred within six hours, or should there be a relapse the treatment should be repeated.

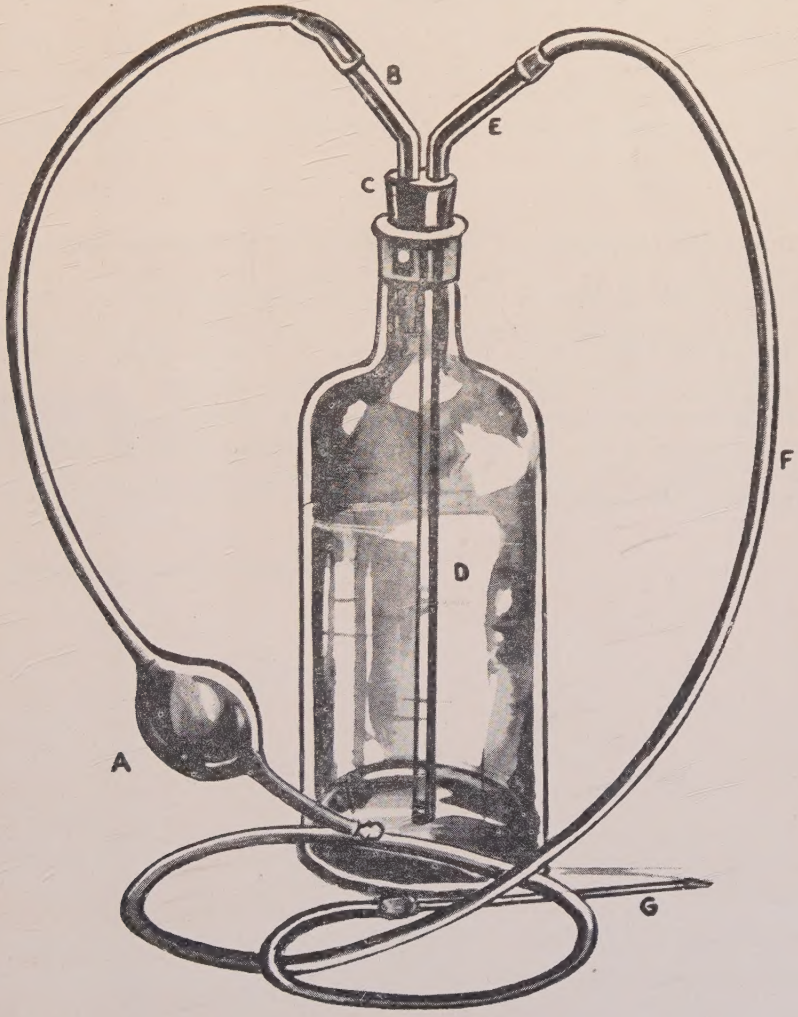
Milk Fever Inflation Outfit.
A. Pump.
B. Air filter.
C. Teat syphon (tube).

It is interesting to note that this method of treatment is purely empirical, and that it was successfully practiced for many years before the actual cause of the disease became known. It was developed as the result of an erroneous conclusion on the part of the Danish veterinarian, Schmidt, who had formed the opinion that the disease was due to the presence of a ferment or virus in the udder tissues. He consequently injected a solution of potassium iodide which he believed to possess antiseptic properties. A rapid recovery occurred. When other solutions were employed the same satisfactory result was obtained. Equally good results were secured by the injection of sterilised water. This was in turn replaced by the inflation of the udder with air and when this practice became generally adopted the mortality rate was reduced to almost negligible proportions.

(2) *The injection of calcium borogluconate solution.*

This is a rational treatment which is based upon a knowledge of the cause of the disease, the purpose of the injection being to restore the depleted blood calcium to its normal level. It is preferred to udder inflation on account of the fact that it obviates the risk of mastitis, and is not followed by a decrease in the milk yield, which is a common sequel when treatment by inflation is employed. Apart from this, both methods of treatment are about equal in efficiency.

The solution for injection is prepared by stirring a mixture of two ounces of calcium gluconate and three drachms of boric acid into 12 ounces of boiling water until it is completely dissolved. The solution is allowed to cool to blood heat before injection, and the whole of it is administered at one treatment. Making for greater convenience calcium borogluconate may be purchased in carton form. Each carton contains the requisite dose of the drug which when dissolved in a given amount of water produces a solution which is immediately ready for use.



Calcium Borogluconate Injector.

(A) Air pump (enema syringe). (B) Air inlet tube. (C) Perforated rubber stopper. (D) Twelve ounce bottle containing calcium borogluconate solution. (E) Outlet tube for solution. (F) 2 ft. 6 in. length of rubber tubing. (G) No. 12 saline needle.

As it is necessary to administer a relatively large quantity of calcium borogluconate solution it is advisable to employ an outfit which will enable the injection to be made quickly and efficiently. An injector which will be found suitable for this purpose, and which may be made up at a comparatively small cost, is reproduced in the diagram on the previous page. A rubber enema syringe will serve quite well as an air pump. When air is forced into the bottle by pressure on the rubber bulb the solution is forced out and flows freely through the needle. The injections should be given at four points along the neck, approximately three ounces of the solution being injected beneath the skin at each of the sites selected. The needle and tubing should be sterilised by boiling before use. The hair over the site of the injection should be clipped and the skin cleansed by swabbing with methylated spirits. In making the injection a fold of skin should be taken up between the fingers and penetrated by a thrust with the needle which can afterwards be felt lying immediately beneath the skin. By pressure on the rubber bulb the required amount of solution may now be injected. When the injections have been completed the cow should be propped in the natural recumbent position and supported by bags of earth or sand placed alongside the shoulder. As is the case with udder inflation, a rapid recovery is usual, normal health being regained within the space of a few hours, in the great majority of cases. The treatment should be repeated if recovery has not occurred within six hours, or in the event of a relapse.

Prevention.

It is a well established fact that the practice of milking cows completely out during the first 72 hours following calving may precipitate an attack of milk fever. Consequently, it is advisable to remove only small quantities of milk from the udder during this period and this procedure will be found of distinct value as a preventive. By allowing the calf to remain with its mother for a similar period and relieving the udder only when necessary, the same object will be achieved.

In the case of cows which are highly susceptible to the disease and are likely to become affected at each successive calving, an injection of calcium borogluconate given immediately after calving and repeated 24 hours later will generally succeed in warding off the attack.

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